ISASC

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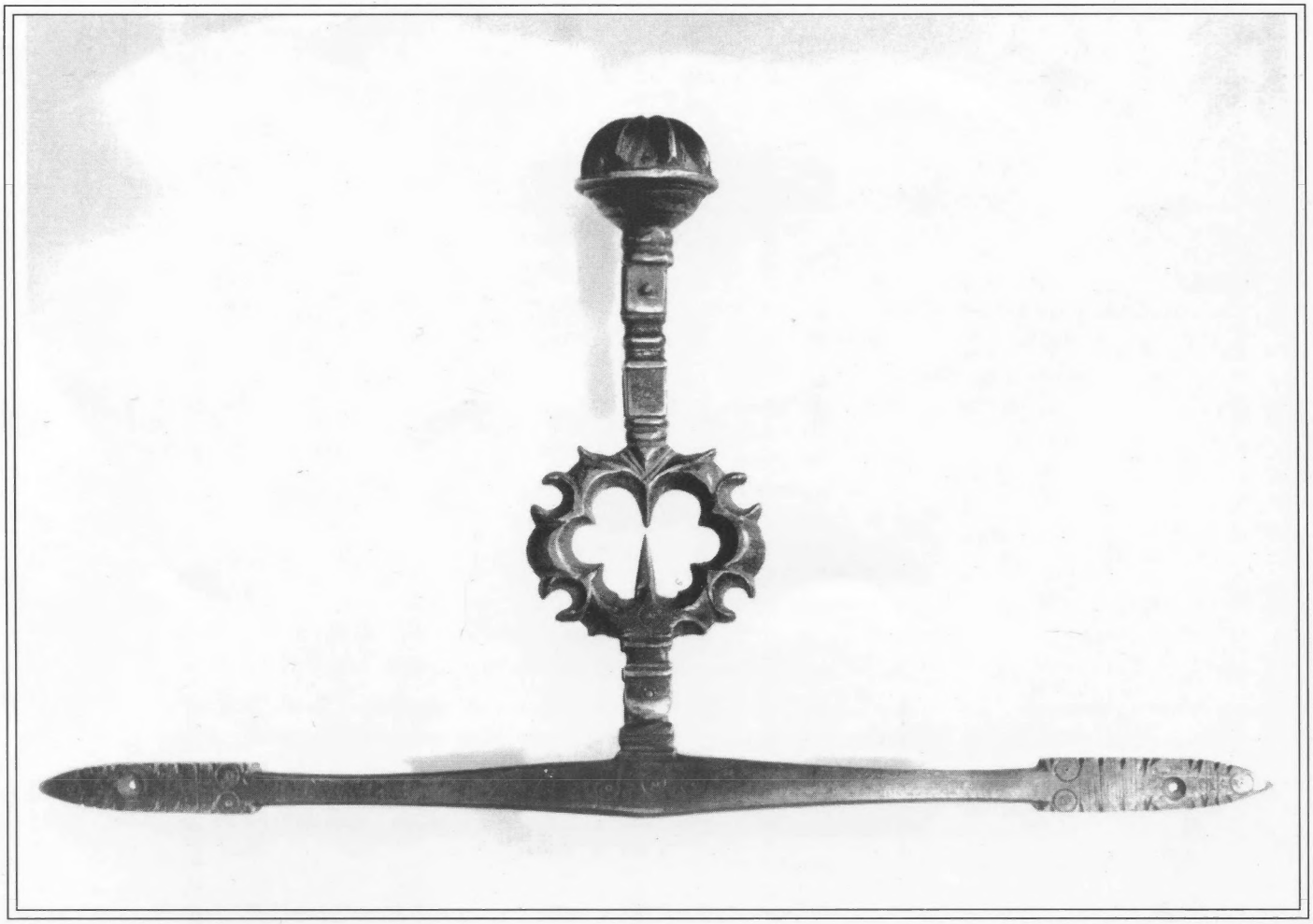

Cover Picture

This scale was bought in Kerala (see page 2311 for map) in Southern India, and said by the seller to be "*in the old local style*". The brass beam is 12 ins (300mm) long, cast in one piece with the pointer. The central fulcrum is ¾ ins (15mm) up the pointer, so that the beam tends not to rock once loaded. The addition of 10% extra load was needed to make the beam tip at all. [These incredibly high fulcrums seem to be a feature of Indian Ocean scales, being seen right up to the present day on scales from India, Afganistan, Bahrain and Madagascar. Is this due to Arab traders' influence?] The assumption might be that it was made by an idiot, or had a unique ceremonial purpose. Yet four are known: one in the Science Museum in London, one 17¼ ins long auctioned in May 1996 at Christie's in London, one owned by Jerry Wilson (see pages 2311-2319) and this example.

A second pivot-point is 4 ins (98mm) above the beam, and yet another 5 ins (123mm) above the beam. These allow the user to hold the scale at an angle, but because they are in the same plane, (not at right-angles to each other), they have no sensible purpose. See p. 2316. The large knob at the top is hollow and contains a large cube of iron. Now it is rusted to the brass, but possibly it was once free to rattle.

The "knives" are steel pins, and the pointer is captive in a slot in the sight-hole, so (one practical feature) the beam cannot drop more than one inch. The Japanese had a similar system on their *tenbin*, money- changers' scales, see EQM, p. 326. These captive pointers are also a feature on Malay steelyards and Chinese do'tchins, (see Ling Roth's "Oriental Steelyards and Bismars" in *Proc. Royal Anthropological Inst. of GB & Ireland*, XLII, London, 1912), with the sight-hole below the beam.

Nothing is known about its age, use or weights. A guess might date it as 17th or 18th century.

ISASC

INTERNATIONAL SOCIETY OF ANTIQUE SCALE COLLECTORS

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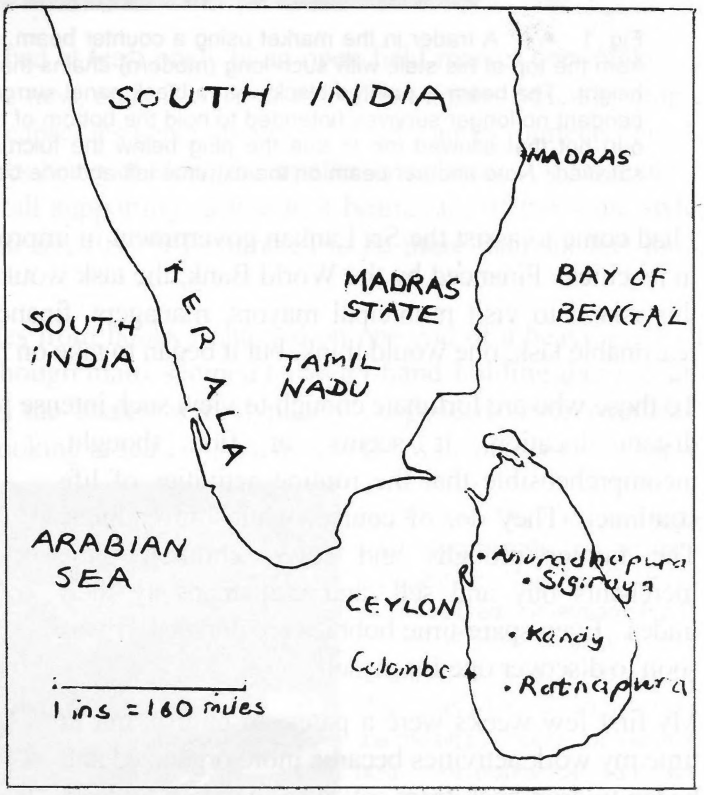
Scale Hunting in Sri Lanka

BY G WILSON

Why do you collect scales? Isn't it fortunate that we don't have to justify our hobbies? In recent years I've learned that scales have a special appeal to my particular psyche. Perhaps it is their unique and varied mechanisms. I definitely have a weakness for fine, precise machinery. Ruth Willard once told me she thought the concept of balance, something widely needed in this world, was part of the appeal. This thought intrigues me and may be part of my own subconscious rationale. Scales are even handed, fair and without bias. In any event, though I have been actively collecting for only about eight years, I realize that my liking for them has existed much longer. I still have the first scale I acquired over half a century ago, a little Penn counter Roberval that I used to measure photographic chemicals as a teenager.

My active collection story starts in Sri Lanka (formerly Ceylon[1]), which my wife Eva and I first visited in 1979. We found it delightful in all respects, with charming people living in a lush tropical paradise remote from our western world. We were there for only a week or so, and I regret to say that, as tourists, our penetration was superficial. We did not sense the rising tide of ethnic and political turmoil, and left the island totally charmed.[2] Our views were little changed when in 1987 I was offered an opportunity to live and work with these people. News of this tiny, secluded country rates little space in the US News media, and we were unaware of the degree to which their problems had escalated. Little wonder we jumped at the chance!

Alas, poor little Sri Lanka! How appropriately teardrop shaped, lying in the Indian Ocean. We were stunned by the changes. Deep scars were still apparent in many parts of Colombo, the capital, from the bombings and riots that had erupted in 1983 between the majority ethnic Sinhalese (74% of the population) and the principal minority Tamils (18%). The charming old Pettah district, badly damaged, was struggling for survival. Tourism, a major revenue source, had fallen off badly , and hotels built for that trade were experiencing high vacancy. We quickly learned that these riots had been accompanied by savage massacres, reopening ancient wounds. Sadly we adjusted the "paradise" image in our minds to a new reality.[3]



Government functions were nearly reduced to extinction in the north by the LTTE (Liberation Tigers of Tamil Eelam), a militant extremist group seeking to establish an independent *Eelam* or homeland there. In the south the JVP (Janathja Vimukthi Peramuni or People's Liberation Front), a violent, left-leaning Sinhalese group, inspired and enforced massive strikes and roadblocks. Political assassinations were a daily affair. Indeed, men were prohibited from riding double on motorcycles, as assassinations with an AK-7 from the pillion (rear seat) riders were so common. We were yet to learn the depth of the economic and political damage done in the years since our last visit.[4]

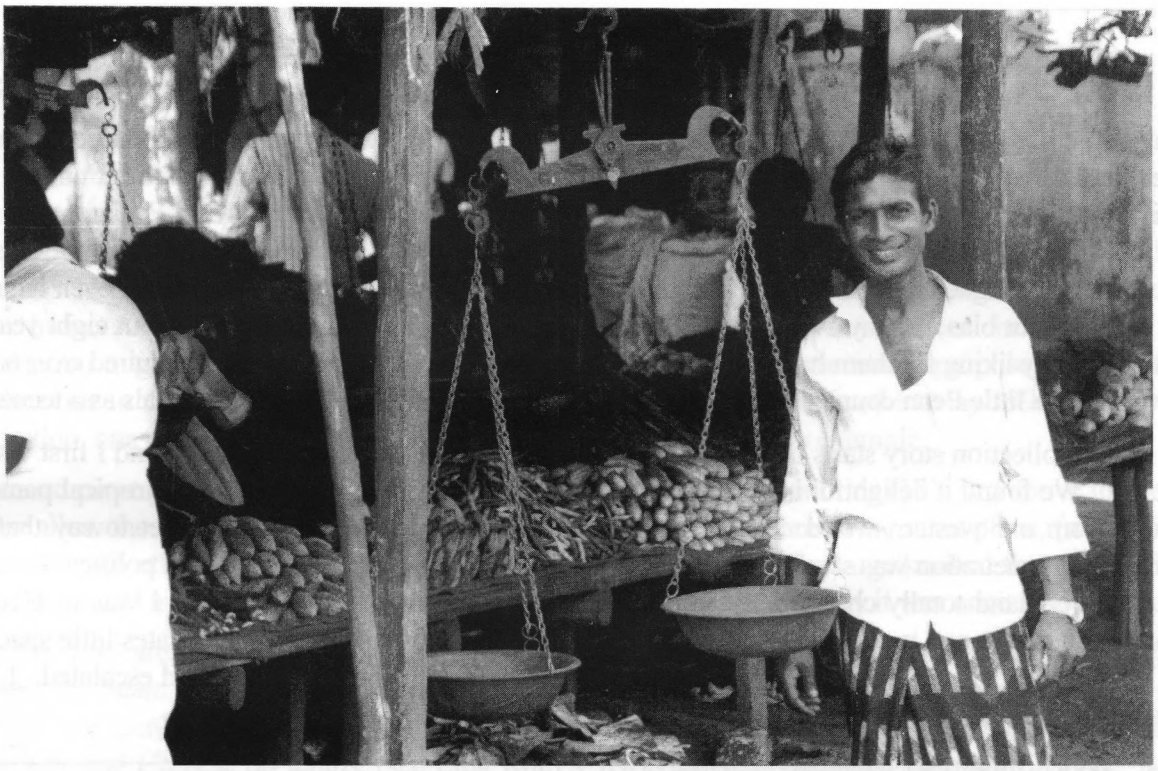


Fig. 1. ⩙⩙ A trader in the market using a counter beam, about 24 ins (600mm) long, conveniently hung from the top of his stall, with such long (modern) chains that he could fill and dispense goods easily at hip height. The beam is painted black, with a black panel surrounded by red on each side of the fulcrum. The pendant no longer survives (intended to hold the bottom of the shears firmly so that the beam could not fall out) but that allowed me to see the plug below the fulcrum on which the inspector placed his stamp if satisfied. Note another beam on the extreme left and one behind the trader. Compare with Fig. 2.

I had come to assist the Sri Lankan government in improving the efficiency of municipal management in its cities. Financed by the World Bank, the task would take me and my management teams all over this island to visit municipal mayors, managers, finance officers, tax collectors, engineers, etc. A reasonable task, one would think, but it began to take on new proportions!

To those who are fortunate enough to view such intense political and economic chaos from a stable and distant location, it seems, at first thought, incomprehensible that the routine activities of life continue. They do, of course, while life endures. The farmer ploughs and sows, children play, merchants buy and sell, and craftsman ply their trades. Even spare-time hobbies are pursued. I was soon to discover one for myself.

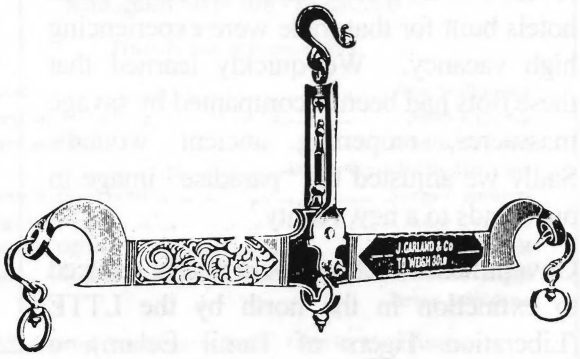


Fig. 2. ⩙⩙ W & T Avery Ltd, 1909, '*Second Quality Counter Beam (J Garland & Co. Brand). Specially manufactured for the Indian Market.*' Compare with figs. 1 & 3. Note the twirl on the end of the suspension hook, just the same as the scale in Fig. 3. Note the black panel to take the maker's name. As it was only painted, not japanned, the finish would wear away rapidly, and would consequently be re-painted by local craftsmen, using the conventional panels of black.

My first few weeks were a panic, of course, but in time my work activities became more organized and began to drop back from seven to five days a week. I felt the need and began to have the time to gain some grass-roots knowledge of this country. My driver and I began traveling at weekends to small villages, to the tea plantations in the mountainous areas, to the gem country in the south, to small fishing villages. Finally we visited the ruins of the

ancient cities of Anuradhapura, Sigiriya, and Polonnaruwa, fabulous civilizations in their time, created by these people in bygone centuries, and I began to appreciate the depth, sophistication, and culture of this ancient civilization. The ancient engineering achievements on this tiny island are said to have rivaled those of Rome. How did it evolve from grand cities of long ago to the simple agrarian culture of today?[5]

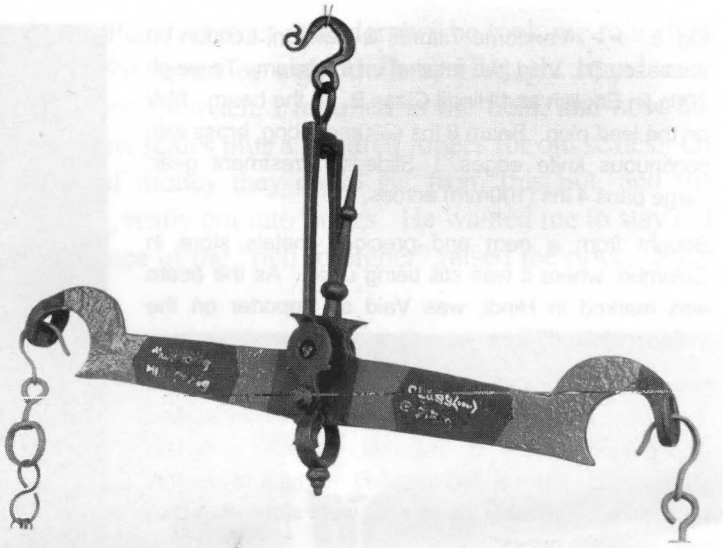


Fig. 3. ⩓⩓ W & T Avery beam 20½ ins (510mm) 12lb. capacity, Class D, in typical black and red pattern. Note that the paint has been put over the corroded surface of the iron. The end hooks are replacements for the originals, and do not look strong enough to take a full load! Avery's, in the 1909 catalogue, did not explicitly state that these beams were of too low a quality to be Class C, but the mere fact that they were made specially for India (and that included Ceylon) suggests that.

I found myself drawn to the market-places. Even the smallest village had a market area, some covered, some merely an acre or two of open fields. Every day, farmers, fishermen, spice merchants, and others congregated to sell and buy. As I wandered through these thronged markets my eye was caught again and again by the scales, and my fascination for them began to emerge. Every merchant had at least one! In an open field market one might see dozens of scales at once. None seemed to be new, and all were of the same variety, typically simple equal-arm beams with hanging pans. Beam capacities generally ranged from four to fourteen pounds depending on the merchandise, the larger ones being of steel, the smaller ones brass. Occasionally I would see a sturdy tripod six or seven feet tall supporting a five-foot beam, still of the same style, usually being used by a grain merchant. One such beam I estimated to be more than six feet long. Would that I could have carried it!

In the fields some merchants hung their scales from hooks fashioned on one end of a heavy piece of steel reinforcing-rod driven into the ground, though many seemed to prefer hand-holding them, even for heavy loads. In the covered markets the scales were typically suspended from overhead. Fascinated, I wandered from booth to booth looking at scales. As a neophyte I was unaware that these

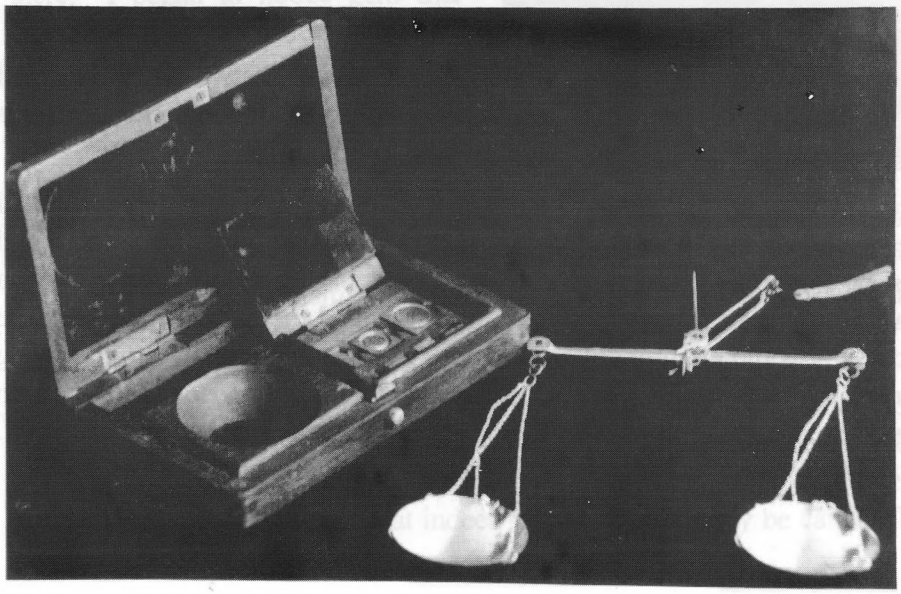


Fig. 4. ≺≺ Tiny hand-held scale used occasionally by a gem-merchant in Negombo. Beam silver-coloured (German-silver?), 3½ ins (82mm) long, with carat weights 1, 2, 3, 4, 8, 16 and 32. (The 1 and the 32 carat weights are missing.) Yellow silk tassel to hold. Hemispherical pans with silver chains.

The British stopped using carat weights in 1907, to use the carat métrique system, so does this imply that the scale was made before 1907? Or did the use of carat weights continue in Ceylon?

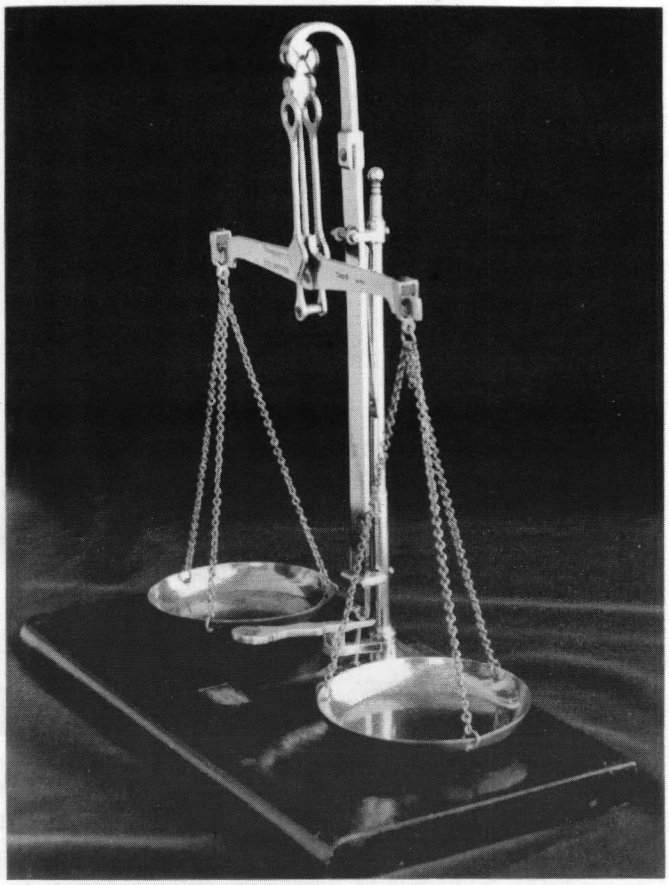


Fig. 5. ➢➢ Vandome Titfords & Pawson, London on the base. D L Vaid [the retailer] on the beam. To weigh 200g [in English and Hindi] Class B, on the beam. MW on the lead plug. Beam 8 ins (200mm) long, brass with continuous knife edges.[6] Slide-lift arrestment gear. Large pans 4 ins (100mm) across.

Bought from a gem and precious metals store in Colombo, where it was still being used. As the beam was marked in Hindi, was Vaid an importer on the Indian mainland?

Note that the pans' diameter is exactly half the length of the beam in the classic ratio on British coin scales. These scales were for Bankers, Inspectors, Bullion Dealers etc. and the user ordered the type of weights he required. Probably the weights were stored in a box, with a set of tweezers.

Vandome, Titfords & Pawson stated on their trade labels *'To her Majesty's Hon^{ble} Boards of Customs & Inland Revenue, The Hon^{ble} Council of India, the Bank of England &c. English & Foreign Weights for Export-ation'*. The name of the firm changed to Vandome, Titford & Co. Ltd in 1910, so the scales were made between the beginning of the classification B, in 1907, and the change of name in 1910.

scales reflected the British colonial period. Later, I was to learn that some came from England (see Figs. 3 & 5) and some, typically more crudely cast, were of local or Indian origin.[7] Steel knife edges staked into the brass beams for fulcrums bore on steel bushes let into the shears. The copper, iron, or brass pans hung from quickly-attached steel hooks bearing on the steel knife edges staked into the swan-neck beam ends. Simple, sturdy, and adequately sensitive. Virtually all were painted crudely black with a red pattern as shown on the scale in Fig. 3, obscuring brand names, inspection stamps, etc, which I didn't know enough about to look for anyway. Now, somewhat wiser and having cleaned a few, I find such names as Michael & Son, William, W & T Avery (this one is steel), and Emilton. The beam-style dates back at least to Thomas Beach's time in the late 18th century.

Raj, my driver, tagged along wondering what ailed me, I'm sure. Occasionally he would get involved explaining to a merchant in Sinhala that I was not interested in his merchandise but inexplicably in his *taradia* or scale.

It was probably weeks before I bought my first scale. I remember it was a vegetable merchant that I approached, hoping to buy his apparently ancient fourteen-inch brass beam with beautiful hand wrought copper pans. When he finally understood what I wanted, his broken English lapsed into a flood of Sinhala, and Raj had to intercede. It seems the merchant wanted me to understand that he couldn't sell me his scale because it would put him out of business. But Raj was getting into the swing of things now. He was a great little guy, about five feet six and a hundred pounds soaking wet, so proud to be my driver for I was the team leader, you see! He washed and polished the car incessantly. Eva was fascinated by his straightening out the rear seat-belts whenever we left the car for a second.

Anyway, Raj came up with a solution. Deep in the Pettah district of Colombo, he took me to a shop that sold new scales. For about 250 rupees (maybe seven or eight dollars) I bought brand new vegetable scales for replacements. Armed with a new approach, I returned to the field, and now the merchants were sure I was crazy, for I was offering new scales plus a hundred rupees for old scales! Of course the merchants tried to stretch the amount of money they could get from this nut, and the haggling began. Raj, born into the world of haggling, really got into things. He wanted me to stay out of sight, explaining to me the obvious, that the presence of the "rich foreigner" raised the price. Such was the process in produce, fish, and meat markets.

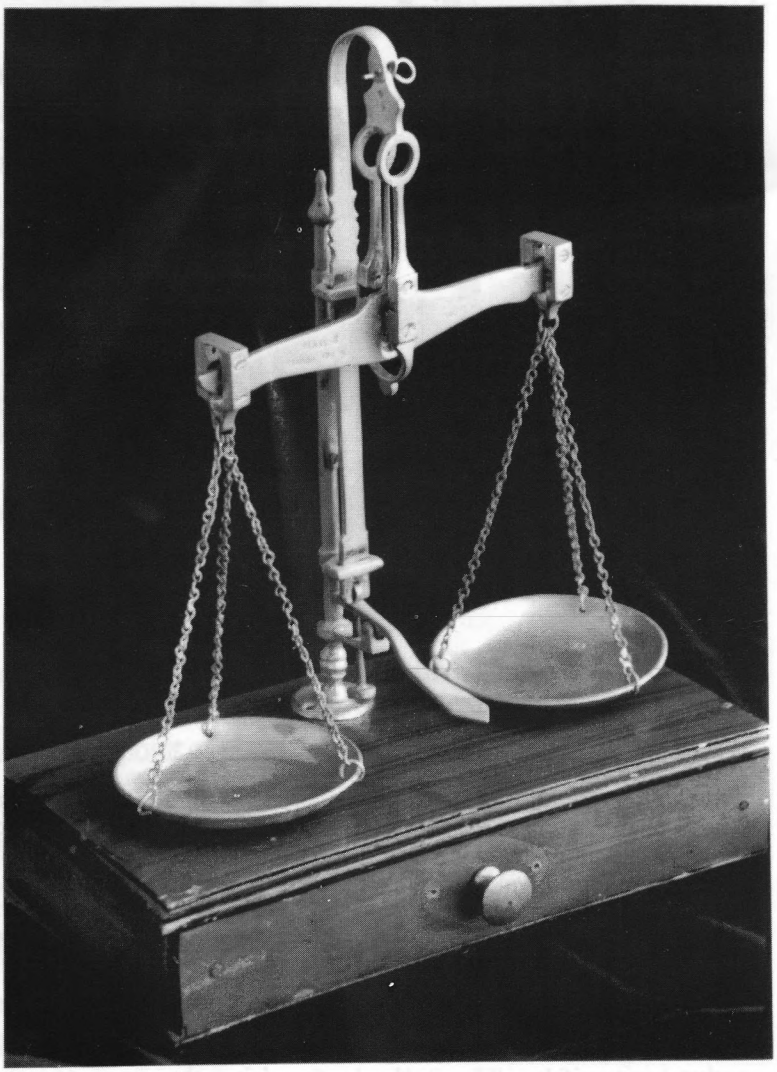


Fig. 6. >> Anonymous scale from a gem store in Kotte (near Colombo), probably a copy of a British scale (like fig. 5). Beam possibly nickel-plated brass, 6 ins (150mm) long with stirrup ends. Beam inscribed Class B To weigh 100g. The lead plug was stamped 84, which might indicate that it was reverified in 1984, as the scale was still being used regularly in 1987.

The beam and pointer can be detached from the shears by lifting the beam up and to the left, the protruding knife coming up the diagonal slot in the shears. This feature was only needed for detachable beams that were prevented by shears or indicator from slotting in from directly above. The feature was certainly in use by 1888 (see British patent 8797, 15th June, 1888) and may have been in use for some time previously.

Note the convenient side plates screwed onto the central bearing and the stirrup ends. These ends look similar to Sharkey ends, but the knives are steel, not agate, so cannot come into the Sharkey end category.

Nor did my exposure to scales stop there. I began to notice gem merchants in hotel lobbies bargaining over gems being weighed on tiny scales. (Fig. 4.) You guessed it, equal arm balances complete with weight sets in little wooden boxes that they carried in their inner coat pockets. These observations led me to investigate the gem shops, unveiling a whole new world of scales used in the gem trade. Here the process differed considerably, and so did the scales. The mechanisms were obviously designed for higher sensitivity. While many were similar at the fulcrum to the larger ones, uniformly they employed continuous steel knife edges for the end pivots. The bearings varied considerably. Fig. 5 shows a widely-used type, having V grooved steel block bearings held by a single screw in the top of a one piece cast or machined stirrup end. A few had agate fulcrum bearings, though most were steel. I found and bought one scale that had steel box-end bearings and steel fulcrum bearings, all of the quick assembly type resembling the Sharkey patent although looking so atypical that indeed it may not correctly be called Sharkey. (Fig. 6.) Often there

were old ones, not in use, that could be sold without interrupting business. Gem shops abounded in the tourist area, but even more so in the mining country around Ratnapura.

My new hobby was serving as a tool to penetrate this ancient culture! Following leads usually obtained by Raj, we travelled to remote villages and mines. At times our judgment may have been a little faulty, for we traversed jungle roads, little more than paths, through areas known to be hideouts of the JVP. But I was able to witness activities that thrilled me, gold jewelry being fashioned using a blowpipe in grass huts and, in the mines, the incredibly rhythmic process of bringing gem-bearing sands from deep pits to inspection tables by lines of workmen tossing full ore pans up and empty pans down the line, two pans in the air much of the time between two workmen.

In the tea country I saw my first Roberval, a strange sight in the land of equal-arm beams with pans suspended below. The merchant saw me for a pigeon (which I was), but he overestimated how high I would fly. That scale may still be in a tea and spice shop in the village of Nawalapitiya on the road to Kandy.

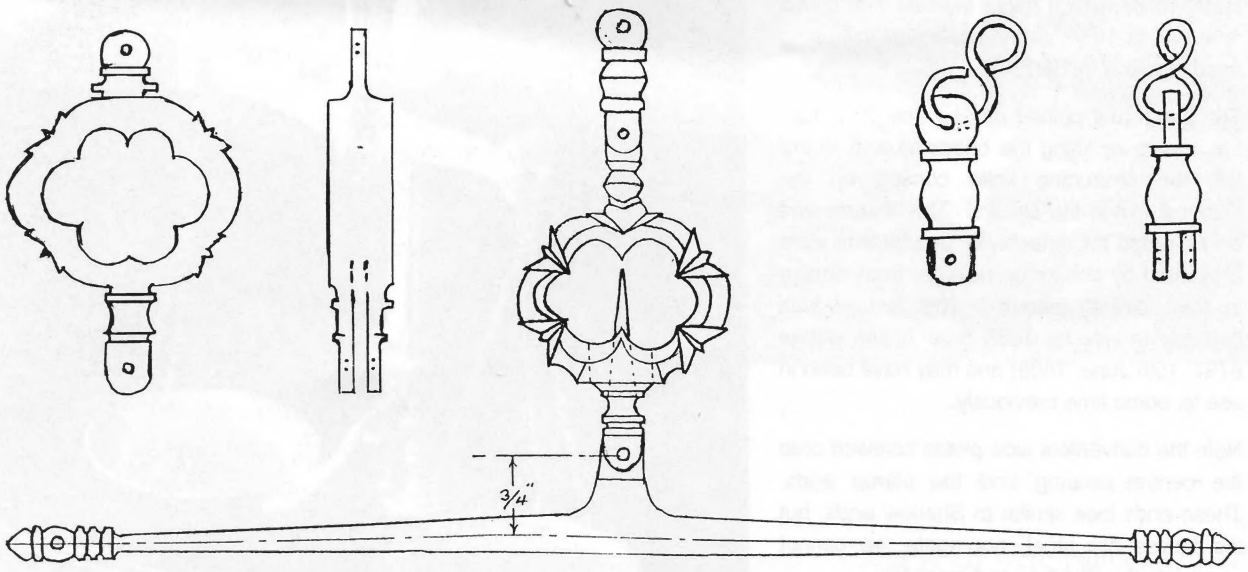


Fig. 7. AA Found in a junk-yard south of Colombo without attachments. Beam brass 12½ ins (335mm) long. Pointer cast integrally with the beam. Sight-hole bifurcated at the bottom, to form short shears, and with a knob above forming a pivot point between the higher shears. The higher shears are the bottom part of a straight piece, with the top forming yet another pivot point. Originally it may have had an ornamental knob at the top, like the one on the cover. All the bearings are round holes in the brass, with brass pins inserted. There are no steel parts. Note that the fulcrum is ¾ ins (20mm) above the line of the end bearings. Drawing by G Wilson

And my "junk shop" find! Somehow in our wanderings we stumbled across a place south of Colombo, near Panadura I would guess, that was loaded with "neat old junk." I'm not sure how the proprietor made money, if he did; maybe by repairing the ox carts used extensively there, or perhaps repairing items and supplying antique stores in Columbo. In any event, within its dusty storage bins I found old scales and scale parts. Among these was a pair of weathered old brass pans, unusual in that each was punched or drilled for four cords or chains rather than three.[8]

It was here that I found the amazing beam shown in Fig. 7, which mystifies me still. Unlike all the others, it is all of one material, brass or perhaps bronze, including bearings, pivots, and fulcrum, and appears to be very old. It is roughly cast, about 12½ inches long and has round holes, perhaps ⅛ inch in diameter, drilled in it for fulcrum and pivots, the fulcrum hole being about ¾ inch above the pivots. The hanger consists largely of a decorated sight-hole attached at the fulcrum with a brass or bronze pin. High friction bearings like these have been in use since Roman times, and pivot points and fulcrum

Fig. 8. ➢➢ Anonymous scale bought in a gem shop near Negombo, apparently in occasional use only. Nickel-plated brass beam, 6¼ ins (170mm) long. Either a local copy of a British scale, or an import. The exotic wood used to make the box suggests a Ceylon origin.

The hanger with glass pan gives the clue as to its intended purpose. It was intended for chemicals that might corrode a brass pan, so glass was used, and it was intended for dispensing, so the pan lifts off easily. The same sensitivity was needed for chemicals and for semiprecious gems.

The British Act of 1904 banned swan-neck ends on scales for trade use (except for large flat swan-necks for crude weighing) because it was so easy to bend one swan-neck to give the trader a fraudulent slight advantage without the customer's noticing. This scale has never been stamped for trade use, so the owner might have evaded the restrictions (*'It's for using in the workroom'*), but it is more probable that it was made during the late 19th century when swan-neck ends were legal and has never since been checked by an inspector.

The weights are Avery Troy ounce, 0.5, 0.4, 0.3, 0.2, with Victorian stamps, so the weights were for trade use, perhaps with another scale.

This assembly could be dismantled and stored in the box, the pillar unscrewing into two parts, and the hanger hinging at the bottom.

were not always aligned. Additionally, a fulcrum point ¾ inch above the pivots makes the beam too stable for useful weighing, and in fact, the pivot points show few signs of wear. As a weighing machine, which it obviously is, it is deficient to the point of hopelessness. What was it used for?[9]

And so it went for eighteen months. Five days of frustration and two days of healing, touring, and scale hunting interrupted occasionally by strikes and road blockages that made travel exceedingly dangerous or even impossible. I left the island feeling that the changes my teams had worked so hard to install would not last. How can a small town mayor dedicate himself to upgrading his governing process when his life is under serious daily threat? In one instance a bomb exploded in City Hall while my team was there!

My minister, Ranasinghe Premadasa, who had inspired my programme, was elected President. His assassination by a suicide bomber on a bicycle occurred shortly after we left. This major Sri Lankan catastrophe only made it to a one column, eight-inch article in our local newspaper here, although eleven people died in the bombing.

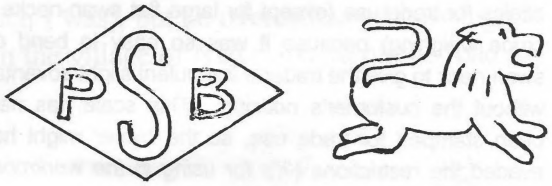
Our departure, itself something of an adventure, involved working our way through a 48 hour curfew by means of our airline tickets. We left with the feeling that we had closed a book without finishing it. Though for that matter, no reasonable last chapter for this book has yet been written on the pages of time.

It was only on our return to the States that I found there are other nuts like me. An antique dealer that I met while pursuing my hobby told me of ISASC. I joined and have reveled ever since in a fraternity of

Fig. 9. ⋖⋖ PSB with registered trade-mark of a running lion. Bought from a gem merchant in Colombo. Nickel-plated brass beam 5 ins (123mm) long, with stirrup ends. Beam inscribed PSB, with running lion, To weigh 10g (in English and Hindi), Class B, 85, A, 10, and other illegible marks. Nickel-plated brass pans 2½ ins (60mm) diameter, inscribed PSB, Regd. with running lion.

Another scale with Hindi on it, again suggesting that it was made on the mainland (maybe in Bombay?)

Nickel was plated over the brass to provide extra durability. Owners who have attempted to clean off remnants of nickel will know that nickel is a lot tougher than brass.

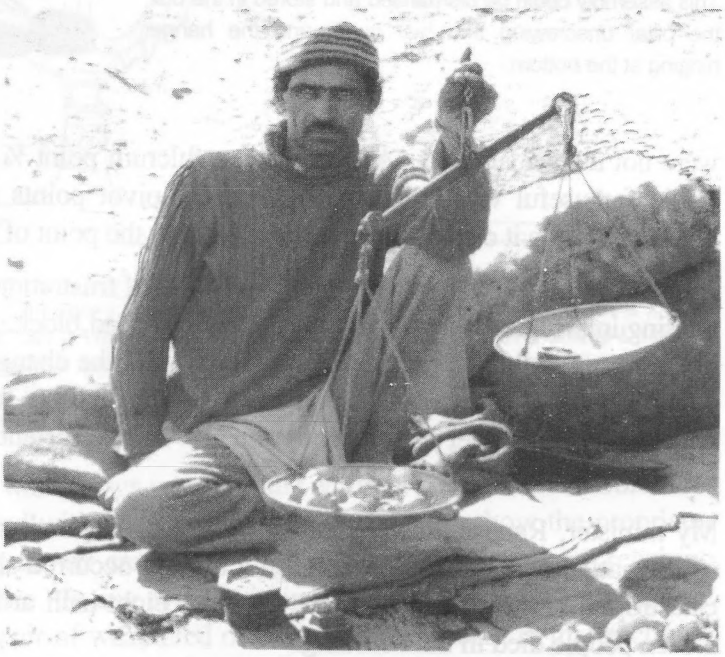


like-minded, delightful people. Would that I had known some of the things I have learned from ISASC, while I was collecting overseas.

It has been observed in these pages by others before me that the adventures incurred in the collection-process may be as valuable as the prizes won. We certainly found this to be true in Sri Lanka.

Fig. 10. ⋎⋎ A trader selling onions. He is using a large hand-held beam with swan-necks, and modern hexagonal weights probably made in Agra, the 'Birmingham' of India.

Scanned by N Cima



Notes and References

1 Most of the scales shown were made while Sri Lanka was still Ceylon, so both names are used in the text.

2 The island is only 150 by 300 miles in area, and on Independence in 1948 had a population of 6,000,000 working in English under the British colonial system, but now has a population of 18,000,000, the majority of whom were educated in either Sinhala or Tamil, not English. The British metrology system was not scrapped, but has gently declined, so produce is still sold in pounds and ounces, but Standard weights are no longer sent out for the W & M inspectors.

3 From my vantage point as confidant to government officials, I learned that the strife between the Sinhala-speaking Sinhalese (Buddhists) and the Hindi-speaking Tamils (Hindus) was as old as their island society, dating back several

centuries before Christ. More than 440 years of colonial rule, however, had interrupted and dampened this strife by creating higher priority targets for patriotic wrath. The Portuguese arrived in 1505 and dominated the island until 1658 when the Dutch took over, only to be replaced by the British in 1796. Finally, 152 years of British colonial rule prior to 1948, with English as the language of government, had driven ethnic strife far from the minds of most.

4 The Tamil population had thrived under British rule. For whatever reason, they more-readily seized the educational opportunities present and embraced the English language as their tongue. They did well in the British Civil Service and tended to be more affluent than the Sinhalese. When the British left in 1948, ethnic and religious strife was rare, and blending of societies was commonplace. Sinhalese and Tamils shared clubs, universities and sports and worked together in government. Soon after the British departed, however, ethnic differences began to appear, and in 1956 a fervent nationalist government, supported by the Buddhist hierarchy and headed by S W R D Bandaranaike, came into power.

One of his first acts was to make Sinhala the national language and the language of government. Bandaranaike himself soon realized the Pandora's Box he had opened and attempted modifications, only to be assassinated by a Buddhist monk. The fuse to many years of tragedy had been lit. Because Hindi and English were limited in official usage, the Tamils were increasingly at a disadvantage in government employment, university admissions, and even in the market place. From 1956 to 1980 the Tamil share of government jobs dropped from 50% to 11%!

5 Anuradhapura, by legend founded in the sixth century BC, and dating from the third century BC, was one of the great international centres of Buddhism, the state religion. With stately homes, beautiful palaces, lakes, gardens, hospitals, and cemeteries, it survived for nearly thirteen centuries.

And spectacular Sigiriya! In the fifth century a renegade prince, after capturing and slaying his father, usurped the throne rightfully belonging to his brother, built a magnificent palace and interrupted the pre-eminence of Anuradhapura for two decades. Present-day tourists marvel at how, in a mere 20 years, he accomplished this feat, as the palace, baths, gardens, and appurtenances occupy the three-acre top of a granite monolith with nearly vertical sides rising 600 feet above the surrounding plains. Today, only remnants of the awesome Lion's Staircase exist, but how they excite the imagination!

Polonnaruwa, the successor to Anuradhapura, reflected the skills and knowledge gained over the centuries by this industrious culture, but declined after a mere two centuries as rising mercantile forces created a population-drift from the interior to the growing seaports. In moments of sober reflection I realize that my touring of these ancient cities has been a powerful factor in my orientation in this culture. Simple and agrarian as it seems today, this society has an extraordinary depth and scope. What have the centuries since Anuradhapura done to the people? My personal view has been forever changed.

6 Crawforth, M, *Handbook of Old Weighing Instruments*, p 64, fig. 18. This drawing shows the method of construction.

7 The Indian states of Madras and Tamil Nadhu, inhabited by Tamils, are 20 miles away, across shallow water.

8 Scale pans used in Southeast Asia and Japan characteristically have four holes.

9 Since this writing I have learned about several other scales like mine. See the Cover Picture.

Alexander, J H, *Universal Dictionary of W & M,* New York, 1867. *Bahär*, Ceylon weight of Dutch origins equivalent to 520.6752 avoirdupois pounds, and also *Candy,* a Ceylon weight of English origins equivalent to 500 avoir pounds.

Chaney, H J, *Weights and Measures...in the British Empire*, London, 1897. "The authorities administering the Government in Ceylon are provided with copies of the Imperial Standards, although native weights and measures are also used."

Ricketts, C & Douglas, J, *Marks & Markings of the British Isles*, Taunton, 1996, ISBN 0 9528533 0 2. The list below provides a small insight into the administration of Ceylon. Presumably, until about 1868, Ceylon was administered from Madras, then was autonomous within the British Colonial system, with its own Standards, from 1870. It was freed in 1948.

Authorities Supplied with Standards and the date they were supplied by The Exchequer in London

Presidency of Bombay, Fort William.....17.6.1829	Bengal.....19.1.1864	Maharajah of Travencore.....15.5.1872
Presidency of Madras, Fort St. George.....17.6.1829	Madras.....7.10.1864	Calcutta Mint.....13.8.1872
Presidency of Bengal, Fort William.....17.6.1829	Madras.....13.10.1865	Government of India.....4.12.1873
Messrs. Colvin & Co., Calcutta.....7.6.1831	Ceylon.....8.7.1870	Government of India.....7.10.1875
Bombay Presidency.....26.5.1841	Indian Government, Bombay.....12.6.1871	Government of Ceylon.....9.2.1877
Madras Presidency.....26.5.1841	Maharajah of Travencore.....13.6.1871	Colonial Store Department, Ceylon.....8.1.1877
Bengal Presidency.....26.5.1841		

Author's Biography

Gerald B Wilson, "Jerry", ex-U.S. Navy and airline pilot, took his Bachelor's degree in Civil Engineering and Masters in Public Administration at the University of Southern California in the 1950s. After a career in Public Administration, managing elements of city and county governments, he took an early retirement from San Diego County, California, where he held the position of Assistant Chief Administrative Officer, to pursue a new career as a consultant to underdeveloped countries seeking to emulate U.S.-type local government structures.

Czechs and Balances

BY J KNIGHTS

As the CSE aeroplane touched down, at Ruzyne airport, the strains of *Vltava* from Smetana's *Má Vlast* drifted out of the cabin loudspeakers. I judged this gentle demonstration of national pride to be largely admirable; my lofty emotions being tempered only by the redolence that I find, in that best known of Czech tunes, for *When Father Papered the Parlour*.

Within an hour of getting off the plane I found myself once again in Prague, almost ten years since I had last visited that most spectacular of European capitals.

It must have been a long and difficult decade for the people of Prague who had had to adapt to the fall of Communism, their country's separation from Slovakia and the capitalistic way of life, which the East of Europe once so fervently desired, only to realise when it came, that it had its own menu of horrors just as real as those endured under totalitarianism.

We were there for a holiday, having been directed to Prague by the mere inability to get a booking for more favoured destinations. Whilst, therefore, I might reasonably have been paraphrasing old W C Fields by concluding – "on the whole, I'd rather be in Stockholm" my collecting cortex was, in reality, beginning to gently pulsate at the prospect of being back in the land of the Phanzeder.

During my previous visit to Czechoslovakia, as it then was, I had done my mandatory tour of the street markets and had noticed that amongst the ranks of Soviet-style semi-self indicators there lurked the odd Baroque counter machine within which the mechanism was not, as expected, Beranger but rather Phanzeder; that alternative system of subsidiary levers that had long been known about but never allowed in the UK. It apparently incorporated a heretical compression link which was long ago deemed to be no way for good Christian folk to transmit forces.

I had subsequently looked for these machines in East Berlin and even Dresden, where one would expect that examples of the scale would be found in profusion, as it was principally a production of Saxony. I saw no sign, however, either on market stall nor, more pertinently, in antique shop, so it all remained as a dream remembered for a number of years.

Back in Prague in 1998 I had worked out that, by now, all the market stalls would be equipped with horrible digital weighing machines and that there would be an extensive network of antique shops in a city in which tourism must be a major factor in the economy. Those non-self indicating machines of ten years ago should by now, be gathering dust in such an outlet waiting for some weird character (such as myself), to come along and express an interest.

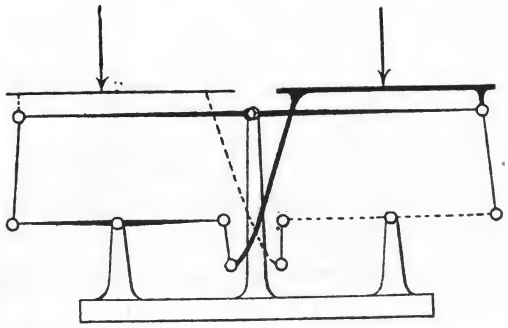


Fig.1. ⩙⩙ Drawing from Brauer,[1] who commented *'Essentially of greater perfection than Hoffman's system and Kuppler's system, are the duplex pan balances of Phanzeder which were specially developed by Phitzer Brothers in Oschatz, Germany'.*[2]

I was actually wrong about the electronic scales, which featured only rarely on the stalls of Havelska. The serried ranks of Soviet semi-self indicators still stood along the market but there was no sign, this time, of the simple counter machine. Judging by the amount of high pressure hustling that goes on in the streets, to sell all manner of tourist tat, arts and crafts, tickets for innumerable concerts, etc, the people of Prague certainly seem to have got the hang of capitalism. The development of a western style retail sector has, fortunately, resulted in a number of antique shops selling mainly items of the recent past. These at least, offer a class of merchandise with a smattering of history and a degree of quality, somewhat at variance with the run of tourist shops offering a commonality of banal Bohemian glass and garnet-infested jewellery of decidedly gaudy stripe.

It was in one of these antique shops that 'pay dirt' was finally struck. No less than three Phanzeders [or Pfanzeders] were discovered, nestling amongst miscellaneous coffee grinders, hat boxes, toasting forks, etc. As usual, the appraisal of the items took into account condition and originality (one was excessively cleaned up to appeal no doubt, to the interior decorator rather than the collector) but on this occasion, the additional aspect of dimension became an equal consideration. When one is faced with the prospect of lugging a cast-iron scale from Central Europe in a suitcase, barely large enough to take even one's mundane appurtenances, size is definitely important.

The smaller of the two acceptable scales was a nice little green number with brass pans which had, fortunately, never seen a tin of Brasso or its Czech equivalent (I have long held the view that metal polish should be only supplied on prescription having seen more metalware ruined by over-zealous cleaning than by neglect), and with most of its original paintwork intact.

I was at last able to examine those 'Albigensean' compression links which I found to be largely unobjectionable, as they appeared to work extremely well. The operation of this scale, with its two first order subsidiary levers (those who know, or care, will of course be aware that the Beranger has 'third order' subsidiaries to which no-one has ever objected), has a pleasant contrapuntal action as the beam and levers rise and fall whilst they share out the loads before finally settling for equilibrium.

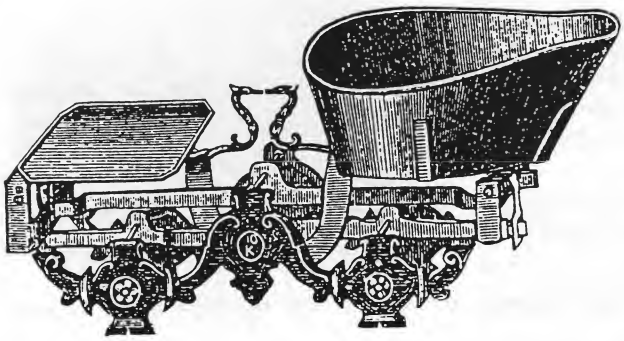


Fig. 2. ⩙⩙ Kopp & Haberland of Oschatz, catalogue c.1880, counter scale, system Pfanzeder.

In addition to its dynamic aestheticism, the machine itself is pleasantly formed with an elaborate cast-iron base featuring winged dragons grasping a golden ball, each side of a central cartouche in which appears the head of Hermes. The tails of the dragons rise up to form the stops for the pans. Those beneath the pan, that must

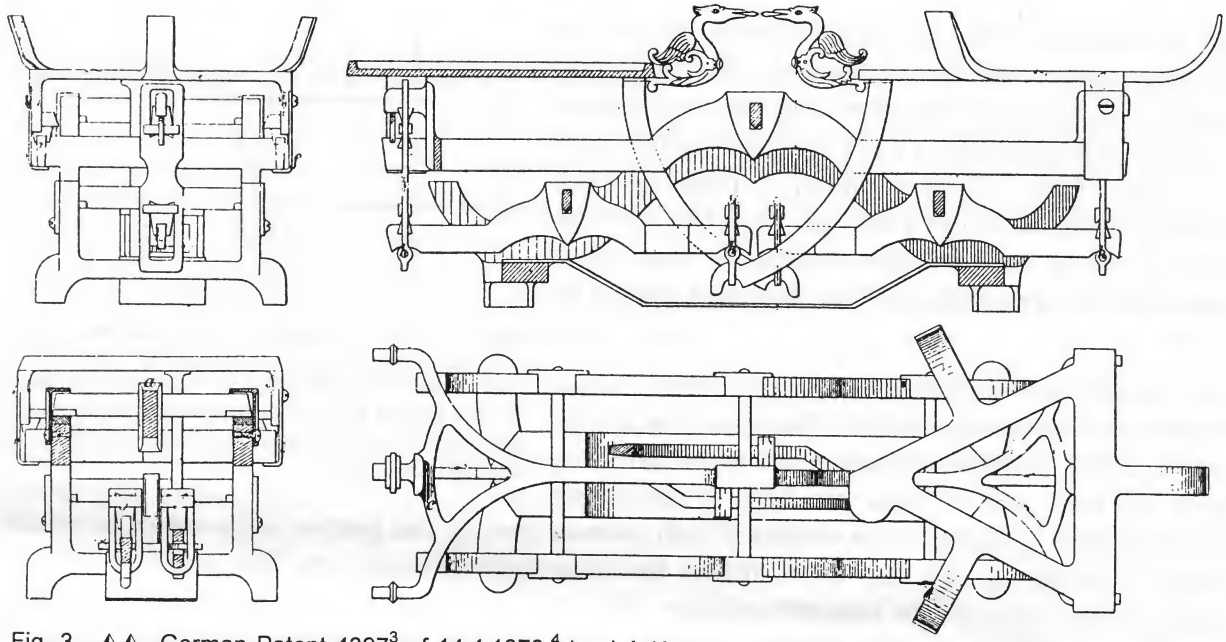


Fig. 3. AA German Patent 4397[3] of 14.4.1878,[4] by J A Keppeler of Stuttgart, counter scale on the Phanzeder system, but with Keppeler's improvements. The upper beam, previously made of several pieces rivetted together, was one piece with bifurcated ends. Originally made of wrought iron, this example was made of malleable iron.

have carried the weights, are now nicely indented by many years of weighing.

All in all, it is a most satisfying piece of equipment even though it bears no indication of its maker. This is a pity, because someone has obviously taken some pride in producing a decorative solution to the apparently mundane task of putting scale pans above the beam.

In reality, of course, the achievement was far from mundane, as the placing of the weighing pans above, rather than below the beam, was a fundamental act which changed the scale from a technical instrument into an everyday machine of simple commerce. The transformation was achieved by either adapting the principle of Roberval; which is mechanically simple but theoretically complex and which one feels works, but only just, or by using subsidiary levers, with all their intricacies of operation but underlying mechanical rectitude.

The endless variations of the Roberval[5] and Beranger have always been a joy to behold and now it is exciting to finally have an example of the 'third way' (as we say in Britain these days) of achieving the desired effect. There is, I believe, an inverted version of the Phanzeder where the subsidiary levers are above the beam, thus allowing all the forces to transmit in tension.[6] Where might one of those be…!

Author's biography. See page 2075.

Notes and References

1 Brauer, E, *The Construction of the Balance*, UK edition 1909.

2 Lindner, J, Die Systeme der Oberschaligen oder Tafelwaagen, *Mass und Gewicht*, p 802. Lindner stated *'This linkage system for counter-scales was first seen in 1869 in Norddeutschen Bund, and afterwards in Deutschen Reich zur Eichung. It was officially called firstly 'Pfitzer's Counter-scale', then in 1872, 'Pfanzeder's Counter-scale', and in 1885, 'System A'.*

3 Brauer, E, op cit, page 236.

4 Schendler, J, *Auflistungen Waagen-Patente*, Klasse 42f, Gruppe 4, published by Mass und Gewicht through 1995-1998. This invaluable list of German patents is classified by type, giving patentee, town, date, and very brief description.

5 Ed- the Roberval was invented in Britain in about 1803, the Beranger in France in 1847 and the Pfitzer/Phanzeder in Germany in 1869.

6 Lindner, J, op cit, p 803. Another variation; illustration showing a half-Pfanzeder and hanging pan.

Indian Weights

BY L A Uit den BOOGAARD

I found a quantity of rusty iron round flat weights, and one ring weight, with strange designs, that, although reminiscent of English weights, could not be from England. After cleaning them, applying rust inhibitor, and weighing them, it seemed to me that every weight was of a different unit, but with the help of Doursther's *Dictionnaire des Poids et Mesures* it became clear that they were from India, where every large city had its own units.

Fig 1. Ed-these units, from several sources, are contradictory. Metrologists and mathematicians please help!

		British India	Delhi	Madras	Calcutta	Bombay	East India
1 candy =	20 maunds	227.2kg		226.8 kg	218.5 kg	254.5 kg	254 kg
1 maund =	40 seers	11.36kg		11.33 kg	11kg	12.7kg	12.7 kg
1 viss =	5 seers			1.41 kg			
1 seer=	16 chittack	0.93 kg		0.2834 kg	0.931 kg	0.846 kg	
1 seer=	40 local rupees						
1 seer =	80 tolas				0.931 kg		
1 seer =	2 tipres						317.5 gm
1 chattak=	5 tolas	58 gm			58 gm		
1 rupee=	1 tola	11.7 gm	10.95 gm	11.67 gm	14.55 gm	11.56 gm	

I understood better when I read in *Men and Measures* by Edward Nicholson.[1] He wrote in 1912:- *Of the measures and weights of India, a country containing one-fifth of the population of the world, divided into many nationalities, only a slight sketch can be given, and that chiefly of the measures used in British India as distinguished from the tributary States. The measures of the Aryan population of Hindustan, and those of the Dravidian peoples of peninsular India, are different; moreover the influence of the Moslem conquerors, Moghul and Pathan, of the Portuguese in the sixteenth and seventeenth centuries, of the English in more modern times, has modified these measures.*

Fig. 2. ➢➢ Cast-iron weight of 62 grams, so probably for 1 chatak. Note the hearts round the border. L Uit den Boogaard

The designs are very nice, with sculpted edges with Roman script and sometimes a native script, and a few have only an Indian script, (leaving me ignorant of everything but the weight). See Fig. 2. However some of them give enough information to sort out something of their purpose. Unfortunately many Indian cultures had weights with the same name, but for a different purpose, in which case the mass was different. Weights for grain and rice were different from ordinary commercial weights, and bazaar [market] weights were different from factory weights and railway weights. See Fig. 4.

Fig. 3. ⩓⩓ Cast-iron ¼ seer INDIA I.F.AGRA with Indian script. L Boogaard

Several of my weights were in SEER or CHATAK units, and I have brass ones in TOLA. To complicate matters still further, in some parts of India the tola is called a RUPEE. Then the spelling varied, for example, the chatak was also the CHITTAK, CHATACK or CHITTACK.

Fig. 4. ⩓⩓ 1 Bazar seer, ½ Bazar seer and 2 Chattack, (¼ of the ½ seer). Made by CAPE INDIA E.M. CO.
Courtesy A Rangeley

One thing you never see on European weights, but was common on my Indian weights, was that foundry-faults were not removed or cleaned up. It seemed odd that they made such elaborate designs then neglected that final polish, to make them the nicest iron weights in the world.

I found the names of many foundries on these weights, usually in Agra in Northern India, where much iron-work is done, (and where a school for training Inspectors of Weights and Measures was set up by the British). See Fig. 5.

Only one had the name of an English foundry, for C H Crane of Wolverhampton with 80 tolas on it, which ought to weigh 906 grams, but in fact it weighs only 441 grams! I have not yet identified the area where tolas were half the weight accepted by the British in India.

Fig. 5. **Companies' names seen on Indian weights:**

A.R. & COMPANY	?
B.C.I.F. AGRA [British & Colonial Iron Foundry?]	Iron 2 Chatak
CAPE INDIA E.M. CO	1 bazar seer, ½ bazar seer, 2 chattack
C.H.CRANE WOLVERHAMPTON	Iron 80 tolas
E WORK	Iron ½ Chatak
INDIA.I.F. AGRA	Iron ¼ seer
IRON FOUNDRY M.L.R.P. AGRA	Iron 2 chatak, 1 chatak, ½ chatak
KASHI - AGRA	?
M.I.R.P. AGRA	Iron 1 chatak
M NAZIR	Square brass 2 oz, 1 oz,
M NAZIR	Round flat "NOT FOR TRADE" 5 BL.TO[LAS]
N.S.& CO	Iron ½ seer, ¼ seer
P.E. CO	?
R.S.K.C.I.FOUNDRY AGRA	Iron?
S.S.I. FOUNDRY	?

Fig. 6. ⩓⩓ Cast-iron 2½ SR INDIA plus an Indian script.
Lou Uit Den Boogaard

Michael Crawforth showed me advertisements in English catalogues for Indian weights. T & C Clarke offered, in 1880, Round Indian Weights of Registered Pattern (with fine lines radiating round the sloping sides) in sets 2½ Seer to ¼ Chittack, the smallest weight made of brass, plugged with lead for 2/1d, or not plugged, for 1/9d. They also offered tall round ring weights of cast-iron from 1 Maund to ½ Chittack.

Similarly, J Hall & Son of Birmingham offered c.1895, flat brass tola weights in sets of ¼ tola

Fig. 7. ➢➢ Cast-iron C H CRANE WOLVERHAMPTON 80 TOLAS. Actual weight 441 grams, which was the Railway weight for 40 tolas. Tolas were used in trade sometimes, for postage and for weighing money. This weight was probably used for trade, being made of relatively crude cast-iron. Lou Boogaard

up to 250 tolas of the Calcutta standard, brass bell or cylinder weights of $^1/_{16}$ seer (1 chatak) up to 20 seers of the factory Maund standard, brass cylinder weights of $^1/_{16}$ seer to 20 seers of the bazaar Maund standard, brass nesting weights of 200 down to ¼ tolas and flat iron weights in 1, 2½, 5 and 10 tolas or ¼ to 2 seers of the Calcutta standard, and iron bell and ring weights to the Bazaar, factory and Railway standard of ¼ seer up to 1 Maund. Some of J Hall & Son's weights were stamped H & S, or J H & S, but the drawings of their Indian weights show no signs of a maker's mark.

Fig. 8. ≺≺ A rubbing from a cast-iron weight, showing the depressed central part only, the outer border on the downward slope being in very abraded Indian script, and illegible. The figures are in high relief, apparently showing a god and a goddess sitting on a long platform. Weight 930 grams, so probably 1 seer.

These weights are not easy to find, and it is somewhat expensive to go hunting for them in India, but they are so attractive, with their decorated edges of stripes, circles, dots and hearts, that I recommend that you search for them.

Notes & References

1. Nicholson, E, *Men and Measures, a history of Weights and Measures Ancient and Modern*, London, 1912, p 167.

With thanks to Michael Crawforth for help with translation.

Fig. 9. ➢➢ This copper-alloy weight was bought in Madhya Pradesh, but nothing is known of its use or age. It weighs 6450 grains (418 grams) and appears to have been made by the lost wax process. Searching through Cambists, no record can be found of a single weight of 6450 grains, although 1½ seers would weigh 6480 grains during the 19th century. As with so many indigenous weights, it corresponds in function to a pound weight, or half a kilo, obviously an amount useful in many cultures.

Author's Biography

Lou Uit den Boogaard collected scales and weights with great intensity, particularly after he sold his factory, and could devote his time to travel and photography. He started by collecting cheap scales, but altered his attitude when he discovered fine English postal scales, and he was immensely helped by Jaap Visser in finding rare and beautiful examples. He wrote many articles for EQM, using a dictionary to aid him, and this one is published posthumously, in memory of one of ISASC's earliest members.

Thaddeus Fairbanks' Invention, 1830

Part 2 - Henry Little's Account

BY A YALE

The following account was printed in *The North Star* of Danville, Vermont, for June 18, 1886, a little more than two months after the death of Thaddeus Fairbanks.[1] It was written by Henry Little, who went to work in Thaddeus Fairbanks' carriage shop in 1818.[2] Other sources confirm that he superintended the erection of the hemp works in 1830 and was involved in the development of the platform scale. In 1830, Little moved to Kalamazoo, Michigan, where he lived the rest of his life.[3]

The introductory and concluding paragraphs praise Thaddeus Fairbanks, but the bulk of the letter challenges the accepted version of Fairbank's invention of the platform scale.

It is reasonable to wonder at Henry Little's motives for waiting until the death of Thaddeus Fairbanks to publish this account. Little was aware of these suspicions, and addressed them in his letter. To date I have located no evidence that casts doubt on either Little's motives or his account, except that they differ so drastically from the standard account.

THADDEUS FAIRBANKS: THE PLATFORM SCALES AND THE HEMP MACHINE

Mr. Editor, Sir: - *The St. Johnsbury Caledonian* of April 15th contained the sad intelligence of the disease [sic] of Thaddeus Fairbanks, with extended remarks upon the sterling traits of character of that remarkable gentleman. I respectfully beg leave to add my testimony to the already abundant proof of his intrinsic worth as a citizen, neighbor, friend, benefactor, and Christian. Thaddeus had natural endowments upon the liberal scale, of a very peculiar cast, which with his diffident or modest reserve, prevented many people from fully comprehending the extent of his abilities. He was a born mechanical genius and possessed rare abilities for new discoveries and curious inventions. Thaddeus was a philosopher, and was intuitively familiar with the mystic principles of natural science. The operations of his mind were very rapid, (not slow as some supposed) and he arrived at his conclusions very quickly, when his convictions were very positive though not always correct.

Thaddeus received but little help from schools or books, nor not much if any instruction in the mechanical arts from his father, who was not a carpenter, (as some supposed) but was nothing but a common farmer who sometimes attempted to make and repair his rude farm implements, before he came to Vermont in 1815.

The Caledonian above refered [sic] to, also related how Thaddeus was connected with the platform scales, and described the way and means of introducing those scales into that place; which *statements are not true,* and many other printed accounts respecting the invention of the hemp machines by Thaddeus, have appeared at different times and places, *which statements are wholly untrue.*

One of those printed accounts had it that Joseph P. Fairbanks performed an important part in bringing those scales in 1830. At that time Joseph had a small book store and law office, in a building next south of the ground now occupied by the savings bank, and had no business connection with his brothers until 1833: and then the field of his operations was limited to the state of Maine, and to sale of their plows.

That vast array of erroneous statements of long standing, with the numerous repetitions of the same since the death of Thaddeus, has led me to conclude that he never rectified any of those misrepresentations. Therefore as it is now too late for him to correct or disprove those false statements, which I am confident were never *authorized* by him, and inasmuch as I was well acquainted with all the facts and circumstances attending or in any way appertaining to the first appearance of the hemp machine and the platform scales at St. Johnsbury, I will hereby state the plain, simple facts in regards to those things, in the same order in which they occurred. I suppose that I was better acquainted with Thaddeus Fairbanks and all his business operations than any other persons outside of his own family circle, during his first sixteen years of his residence there, having been in his employment not less than one-half of that time.

During the winter of 1828-9 a man from Stillwater, N.Y., visited St. Johnsbury and neighboring towns in the interest of hemp culture and the machinery for preparing it for market. His efforts resulted in the formation of the "hemp company" at Barton, which made a contract for a machine to dress hemp, and a contract with Thaddeus to construct said machine during the summer for the said Barton company. In the spring of 1829 Thaddeus went to Stillwater to examine a machine then in use at that place, and consult with the patentee and others interested in hemp

machines so as to prepare him for building a machine, which was done at the Fairbanks shops at St. Johnsbury and then conveyed to and put into operation at Barton in the summer of 1829. There was that much respecting the invention of the hemp machine by Thaddeus Fairbanks.

During the winter of 1829-30 a hemp company was organized at St. Johnsbury, consisting of E. & T. Fairbanks, John and Luther Clark, Moses Kittredge, all of St. Johnsbury, and Levi P. Parks of Barnet, to which John Morse of Barnet was added the next spring. Soon after the formation of that company Erastus Fairbanks, the president of said company, made an engagement with the writer of this to provide materials and workmen, take charge of and superintend the construction and completion of the so-called hemp works, consisting of the necessary buildings, waterworks and all needed machinery, (except the machinery for breaking the hemp, which was to be made at the Fairbanks shops) and all other fixtures required at such works. When that concern came into my hands there was some large timber already on the ground, and also a new frame for a saw mill, which must receive its machinery and be put in operation as early in the spring as possible. During the entire spring and summer the work on all parts of that big concern had been carried forward to the entire satisfaction of all parties concerned, and the time was drawing near when ways must be devised for determining the weight of the different loads of hemp as they were received. I have now arrived at the time when that momentous transaction took place about which so many false, ridiculous and absurd accounts have been printed, each giving a different description of the machine with which we made long, trying and vexatious experiments before we discovered the right method.

One of the accounts said that the load of hemp was suspended by ropes or chains fastened to the hub of the cart while being weighed, while another account has it that ropes and chains were fastened to the axletree of the cart while weighing the load, neither of which ways were possible because of so wide a projection of the hemp in all directions over the sides of the cart. According to another printed statement we made a long and unsatisfactory experiment with a temporary ***platform*** scale, which with many other statements in regard to those matters were *untrue*, and betrayed very much ignorance and a reckless regard for the truth.

In anticipation of our need of an implement to weigh loads of hemp, I had barely made a slight beginning on one or two sticks of timber for the purpose of making a set of the common old fashioned hay scales, at which time Thaddeus happened to call upon me and learned what I had done, and I then informed him that I had seen a kind of scales which were entirely different from the scales I had just begun to make, but had forgotten about them until that particular time, when I recalled those facts to mind, and I told him that the new kind of scales, which I described to him, would be better adapted to our use than any other kind. After much conversation between us respecting the new kind of scales seen by me, he advised me to do no more work on my timbers for the present, and then left for his home. After a lapse of two or three days he called again at the works, and made me acquainted with the results of his deliberation, which consisted of a combination of *wooden levers*, which were adapted to the size and shape of the platform I had carefully described to him at the time of our first interview. I then built a set of platform scales, all of which work (except the metal work) was done by me. As all parts of those scales which were above the surface of the ground and therefore visible I was able to make without any instruction - in fact there was no one there besides myself that knew anything about the matter. I made those scales just like the scales I had seen in public use in Boston while I was living there several years before, which I had described to him so carefully that it so clearly suggested the true principle that he readily pursued until his capacious mind had embraced and matured his plan of a device he had never thought of before.

Thaddeus immediately discovered the correct *principle,* because *no* other *device* was practicable for the large platform scales. That particular device was then and there adopted for weighing, when abstractly and by itself alone considered, was a very small, plain and simple contrivance and involved no new principles, but in some respects there was a somewhat different application of a very old principle which was known and utilized for weighing by the ancient Greeks and Romans. The making and use of those scales at that time created but little or no stir or excitement, and no one thought of using them for anything but weighing hemp. Those scales were ushered into being in that obscure place and in that quiet manner as truly described above, and that was all there was of or about what we then considered as a small affair.

Thaddeus did not have two weeks of hard work and anxious sleepless night, as was said by some while he was performing his *part,* to wit: he simply contrived the use of combinations of levers which were *invisible* when I saw all other parts of the Boston scales. There was no agent at that time who was to be started on his travels abroad to sell those scales, as had been said. No temporary platform scales of any kind were used or even tried at the hemp works. No attempt was made there to weigh hemp with ropes or chains, nor any other temporary contrivance, nor had they been provided for. The large platform scales above described and made and put into permanent use by me were the first and last and only scales ever used at those hemp works for the weighing of loads of hemp. All the mechanical work done at or about those hemp works that year (1830) was performed either by myself or by workmen under my direction, and therefore I know what transpired there.

After those scales had been used a while and having given good satisfaction, in the fall of 1830 I made and set up another set of scales for the use and benefit of E. & T. Fairbanks, at or near whose shops the scales were located. I made the second set in all respects just like the first set, all parts of which were above ground being exactly like those of the Boston platform scales, which plan or style has been continued all the while and is still in use everywhere. Those scales were capable of weighing several tons at one time, and would also accurately weigh a few pounds at one time. It is a remarkable fact that all the large platform scales made by many different men have thus far been made upon the same principle and style as those made by me in 1830. In view of the fact that success of that new enterprise had become an established fact, it caused Erastus Fairbanks to become much elated by what he thought were hopeful prospects of being able to make and sell those scales for weighing hay in a very many different towns in that state and everywhere. In order to carry that hopeful scheme into execution Erastus repeatedly urged me to become a partner with them, and immediately commence canvassing the country. But I was unable to discover any favorable or inviting prospects in that new speculation, and therefore declined his friendly offer. I knew that it was a good and convenient thing when and where it was needed, but as we all supposed that its use would be limited to the weighing of hay I could not at that time expect to sell more than two or three sets in the whole state of Vermont. Such to me appeared to be the true state of things there in 1830.

But there was another and more serious aspect of this case, which I was not at liberty to disregard or trifle with. I knew that the scales I had seen in Boston several years before had been *copied* by *me* and were appropriated to the benefit of others. And I was very confident that the contribution (the levers) made by Thaddeus towards the scales had always constituted an integral or an indispensable part of those scales. I always did, and still firmly believe that *all* and every *part* of those large platform scales which were made by *me* at the time, had previously been originated or invented in Boston; and I had very strong reason to believe that the scales had been patented, and if so then the manufacture of more scales might be of doubtful propriety, if not prevented altogether by the patentee.

In 1831 I was in West Troy, N. Y., in company with Hiram Moore of St. Johnsbury, and he called my attention to a small, iron platform scales, which were like the grocers scales, being capable of weighing 800 to 1000 pounds, and everywhere in use by grocerymen and others at the present time. As those scales were standing upon the wharf Hiram turned them up and examined the under side, and declared that the principle was exactly like the St. Johnsbury scales, and Hiram always after expressed his belief that Thaddeus had derived his first impressions, ideas and perhaps full knowledge of that principle, by seeing the Troy scales. But I was not prepared to accept Hiram's theory in regard to that matter, because I did not suppose that Thaddeus had ever visited Troy. And, moreover, my connection with and perfect knowledge of everything relating to the scales of 1830, made me very confident that Thaddeus received his first ideas and knowledge respecting those things directly from me. It is possible that Thaddeus visited Troy at the time he went to Stillwater in the spring of 1829, although I never heard him say anything about it. Inasmuch as the Fairbanks grocer scales of later years were like the Troy Scales, was suggestive of the fact that Thaddeus had seen the Troy scales at some time before making his scales of the same style.

The fact that platform scales were in use in Boston and Troy at about the same time, and both sets of scales upon the same principle, was a remarkable occurrence. And what was still more astonishing was the fact that neither of those pioneer scales were ever patented; and consequently the Fairbankses were never prosecuted for trespassing upon the rights of the original inventors.[4]

In order to keep my work within as narrow limits as possible, I have omitted many things which I wish could have been inserted. The most perfect, friendly relations always existed between the Fairbankses and myself, and I am *not* influenced by any envy, ill will or desire for revenge, nor would I bring a stain upon the spotless reputation of those honorable gentlemen. Far be it from me to ever desire the detraction of one iota from the merited reputation of Thaddeus as an artistic genius and eminent scientist. Thaddeus would have been a remarkable genius even if he never had had any connection with those scales, and would have stood high above all others at that time and place. His connection with the scales simply imparted a little additional luster to his enviable renown. The long and successful career of the Fairbankses in their extensive operations always awakened my admiration and highest satisfaction. I have often thought that Providence had much to do in directing the singular train of events (which started in Boston more than sixty years ago) in such a manner that the scale business fell into the hands of the Fairbankses, whose vast wealth was liberally and judicially used in benefiting mankind generally and their own community to a wonderful extent. If the Boston or Troy inventors had secured patents for their scales and then have monopolized the business of the scale trade, then a very different state of things would be found at St. Johnsbury.

I would not presume to call public attention to the subject matter referred above, were it not for the many misrepresentations respecting the same, and more especially because the false statements in regard to those matters which have been published at several different places since Thaddeus died, and consequently too late for him to rectify. Therefore I have assumed the responsibility to correct those mistakes. The so-called Fairbanks scales have conferred as

great a benefit upon the mechanical, commercial and business world generally, as any invention of modern times, and that one branch of business had done more for St. Johnsbury than everything else in its whole history. The people have the right to know the *facts* relative to the first appearance of those scales at St. Johnsbury, so that the same may be incorporated with, and constitute a part of the enduring history of that town. It is extremely difficult to disabuse the public mind of impressions, (however erroneous) if of long standing, and therefore I expect to awaken the suspicion, distrust and astonishment of some people, and displeasure of others; but truth has sufficient potency to sustain itself even after having been awakened from a long repose, and lost in obscurity. I desire to repeat in most emphatic terms that I am very confident that Thaddeus never did nor never could have authorized those erroneous statements.

Inasmuch as Thaddeus is not here so as to be heard in regard to those matters, and as I am the only living person who was perfectly acquainted with all the facts in this case, it becomes me to be deeply sensible of the solemn responsibility resting upon me to keep strictly within the bounds of truth.

All of which is most respectfully submitted.

HENRY LITTLE
City of Kalamazoo, Michigan, June 3rd 1886.

Notes & References

1 Little, H, "Thaddeus Fairbanks: The Platform scales and the Hemp Machine" *The North Star,* Danville, Vermont, June 18, 1886, 4. It should be noted that it was not published in the *St. Johnsbury Caledonian,* which had close ties to the Fairbanks family. It is not known whether Little sent a copy to the *Caledonian* or not.

2 Fuller, L, obituary, *St. Johnsbury Caledonian*, December 28, 1879.

3 Little, H, obituary, *St. Johnsbury Caledonian*, June 8 1890, 2. (Misdated, the paper was published on June 5 1890.)

4 Can any reader supply information about either the Boston or the Troy platform scales? Part 3 in the next issue.

Contemporary Document

Henry Little said above, "*We all supposed that its use would be limited to the weighing of hay. I could not at that time expect to sell more than two or three sets in the whole state of Vermont. Such to me appeared to be the true state of things there in 1830.*"

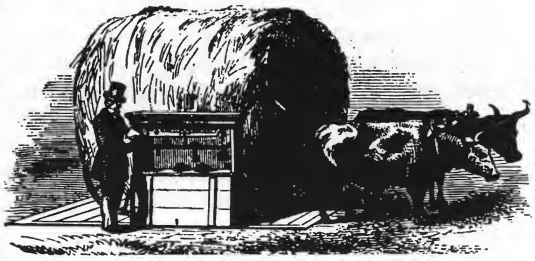


Fig. 1. Fairbanks' Hay Scale, 1865.

If only Henry could have anticipated the future! In their 1865 catalogue Fairbanks said, "***Fairbanks' Hay Scales.*** *More than ten thousand of these convenient and durable Scales have been put up by us in all parts of the United States and the British Provinces... They are made with a shallow pit, or with no pit at all, according to location, as the purchaser may prefer. Note- In most cases our traveling agent will attend to the erection of Hay, Cattle and Coal Scales....*" Fairbanks said in their 1870 Russian language catalogue that they'd sold over 30,000.

Yale states on page 35 of *Ingenious and Enterprising Mechanics* that, "*Only a very small portion of the large platform scales was manufactured in the* [work] *shops in St. Johnsbury. The bulk of these scales was fabricated out of wood provided by the customer at the site of construction....Because of the abundance of forests and the relative scarcity of iron and steel, the larger scales...were made predominantly of wood. Only the iron components of the larger scales were fabricated at the scale-works. During this period the accuracy of the scale depended on the skills of the itinerant installer who assembled and sealed the scale. Neither the bulk nor the weight of the iron parts for a hay scale was great... Bingham, an itinerant agent for E & T Fairbanks, "carried castings and weights for a wagon scale in his saddlebag". When Bingham arrived at the site of the new scale, he expected the pit to have been dug and lined with wood, brick or stone. Piled nearby should be the requisite timbers and planks that the customer had procured. With the help of labourers supplied by the customer, or hired locally, he prepared the timbers.*"

FAIRBANKS SCALES

Bill of Timber for No. 2 Hay Scales
1 stick 14¼ ft. long 7 by 9 inches
1 stick 14¼ ft. long 9 by 9 inches
2 stick 9½ ft. long 7 by 9 inches
2 stick 13 ft. long 8 by 12 inches
2 stick 14 ft. long 4 by 7 inches
2 stick 7 ft. 8 inch long 1¼ by 12 inches
3 inch plank 8 ft. 2 inch long to lay 13 ft.
50 ft. pine boards

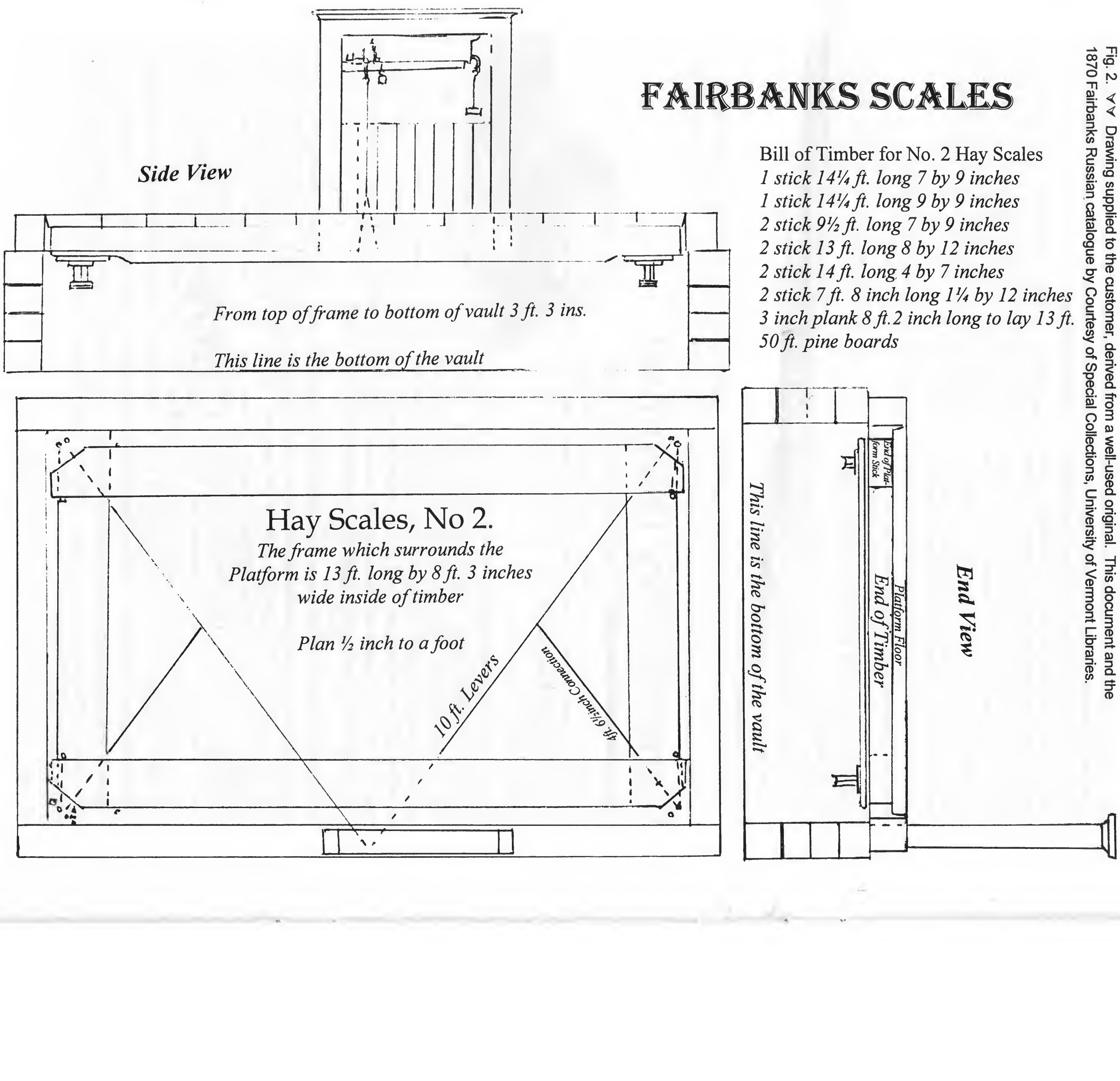


Fig. 2. Drawing supplied to the customer, derived from a well-used original. This document and the 1870 Fairbanks Russian catalogue by Courtesy of Special Collections, University of Vermont Libraries.

Response on W & M Kit

BY A RANGELEY

Inspectors' Outdoor Beam Kit, 1910

Apropos the Editor's footnote, on EQM page 2266, regarding the mode of transport employed circa 1910 for the movement of heavy standards equipment for the testing of weights and measures, it must be remembered that a vast network of railway stations existed throughout the United Kingdom. Also large rural counties such as the North and West Ridings of Yorkshire were split into several districts, each with its own standards. See Ricketts *Marks and Markings of Weights and Measures of the British Isles*, page 158, in which he states that the North Riding had 17 districts, and the West Riding had 21 districts in 1867.

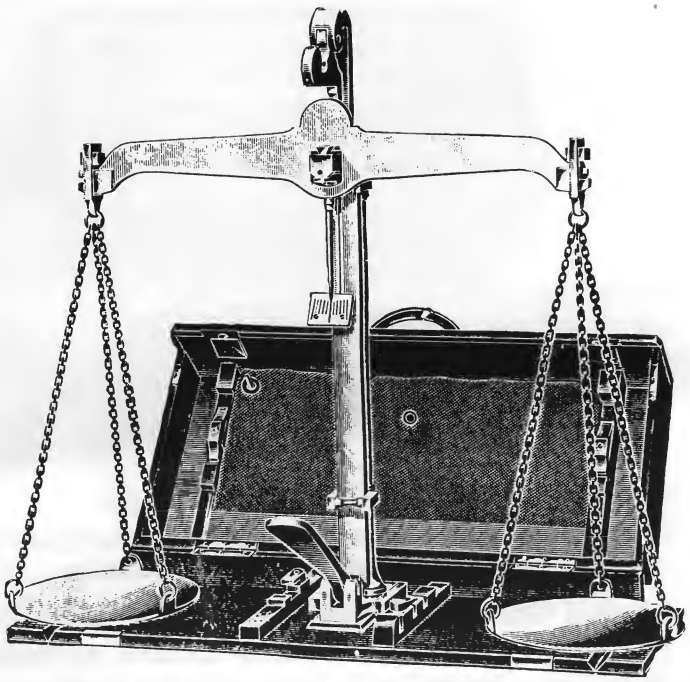


Fig. 1. ⩓⩓ DeGrave & Co. catalogue c.1910, no. 766, Capacity 200 oz Troy. Portable Inspectors' Beam, specially suitable for carrying on bicycles etc. Weight complete 5½lb, made entirely of aluminium with knives & bearings of steel, fitted with patent open shackle to facilitate mounting-up. The depth of the case being only 2½ ins outside, it is especially adapted for carrying on bicycles. For inspectors the beam is made 14 ins long, as specified by the Standards Department, Board of Trade.

The Inspectors had selected villages notably on the railway network, where they would set up their equipment in the village hall or schoolroom after posting notices to the effect that they would be visiting on a certain date or dates for the purpose of testing and adjusting of weights, measures and balances. See an example for the Manor of Slaithwaite on EQM page 1035 of this type of notice (which I submitted for publication). Ricketts states on page 158 that the Manor of Slaithwaite near Huddersfield in Yorkshire had its own jurisdiction certainly up to 1868. Biggs in *Verification Marks on Weights*, page 37, shows a schedule for the Prescot Division of Lancashire printed in 1864, which shows that the Inspector was "on the road" for 39 days each year, but that some villages were only visited twice a year whereas some were visited twelve times a year. This inspector, John Etherington was, for 27 of those days, ensconced in a public house!

This method of checking rurally-based weights and measures existed in the Ridings of Yorkshire in my time with W & T Avery Ltd. up to about the late 1950s to the early 1960s.

To sum up, I would say categorically that the use of a pony and trap or handcart would have been used as far as the railway station and then a handcart would have been hired from a village tradesman to transport the equipment to the appointed place.

So far as a handcart is concerned, one was used by Avery in Leeds during and after the War up to circa 1949 to supplement the one van they had. Small items were even transported by a service mechanic using a tramcar as a conveyance.

How times have changed!

Fig. 2. ⩕⩕ DeGrave's patent open suspending shackle allowing the beam to be instantly mounted or dismounted. Patent 4983 granted to W C Fanner and Elfick 24 Feb, 1897.

Sovereign Rocker Makers

Fig. 1. AA LIGHT SOVEREIGN DETECTOR Sold by Hyam Hyams, AT THE OLD ESTABLISHED BULLION OFFICE 22 CORNHILL. Note that he made no claim to be the maker. Courtesy N BIGGS

Michael Crawforth included every name he had seen on *standard* Rockers in his little book *Sovereign Rockers 1 - Standard Rockers,* published originally in 1983. Several members of ISASC have since sent the names or dates of other rocker makers, and more are requested.

Mark on Balance	Maker/Retailer, Address, Trade	Dates Known
Bourn	John Bourn, 31 Lionel St, Birmingham, brassfounder	1823-1850
B.C.	Bennett Cattle, Windsor St, Birmingham, sovereign balance maker, brassfounder Also marked rockers B CATTLE.	1828-1831
C & S	possibly Crane & Spooner, 26 Cannon St, Birmingham	1828
HULSTON & LUCAS		
H HYAMS	Hyam Hyams, 7 Castle Street, Houndsditch, London, bullion dealer 5 Castle Street, Houndsditch, London, working silversmith 22 Cornhill, London, Silversmith, silversmith, jeweller, clockmaker 59 Cornhill, silversmith, jeweller, clockmaker, moneychanger, inventor & manufacturer. Exhibited at Great Exhibition his object glasses acting as telescope or opera glass.	1822-1851
MIDGLEY & CO.	Charles Midgley & Co, Berry Lane Mills, Halifax. engineers etc.	1867
W W NORTON & CO.		
PALK & NORTON	(see Norton & Palk)	
PICKETT	John Pickett, High Street, Marlborough, clockmaker, whitesmith	1780-1839
P PONCIA		
T.S.	Thomas Simmons, New John Street, Birmingham. Beak street, Birmingham, scalemaker, silver balance maker	1818-1833

Fig.2. >> Advert from Kelly's Directory 1867.

Review

Coin-weightmakers for coins from 24 Countries by G M M Houben, Zwolle, Netherlands, 1998, ISBN 90-70533-08. Price £12. Available from the author, Wateringpark 7-30A, 8025 AM Zwolle, Netherlands, or from ISASC Europe Publications Officer, 93 Sydney Road, Bexleyheath, Kent, DA6 8HQ, UK.

In this publication, his latest book in the series of monographs on weights, scales and measures, Dr. Gerard Houben has produced an extensive revision of his *Special Aspects of Coin-Weights*, Zwolle, 1996, [now out of print].

This 1998 title, printed in English, includes more specific detail covering 24 countries, pan-Europe, [cities and regions] and the USA; it acquaints us with the historical evidence relating to the development of gold and silver coinage by identification marks and stamps on weights, coin-weight boxes [scales and weights in a box], scale pans, styles, etc; furthermore he shares details which should add and fill gaps in the knowledge of the more experienced collector and beginner alike.

Undaunted by the extent of his task, Houben expresses, in his own inimitable condensed style, valuable information in 114 pages; but most importantly, in a work of this scope, he provides us with 119 illustrations of coin-weights, boxes, makers' labels and sketches of beams and beam ends. His patience has been tried somewhat when it comes to identifying certain makers, for in his introduction to names he says, "*It is often a hell of a job to ascertain the name of a coin-weightmaker if only one or more initials are known from the coin-weight or - worse - from a mark punched in a scale pan*". We can all excuse his exasperation as a reflection of the ever-present dilemma encountered in researching artefacts!

Alongside the many other supporting publications Dr. Houben has drawn upon in producing his *Coin-Weightmakers*, this book is recommended for its reference qualities, and he is congratulated for his diligence and effort in imparting his knowledge to us.

R Wilkinson

Response on G.P.O. Weights

From R O FOSTER

I have a set of seven General Post Office weights like the ones pictured in EQM, 2294. I was always of the opinion that the 8lbs weight was not really part of the set because the lifting ring was much smaller than that on the 7lbs weight. This may have been so that the person picking up the weights would notice by the size of the ring which weight he was holding. Makes sense to me.

Editor- My 'set' also has an 8lbs weight with a smaller ring, but the lettering and the broad arrow are also slightly different from the design on the smaller weights.

Response to Bate

From F PEACOCK

The Report from the Select Committee on the Weights and Measures Act of 1835, stated that the fee for verifying a set of Avoirdupois weights and measures was £1.14.0 and additionally, £1.14.0 for a set of Troy weights alone. The stamped indenture certifying their verification was, for the former, £3.12.0 and for the latter, £1.4.0, making a total of £6.18.0 for verifying and certifying.

This fee was that of 1835, but it seems reasonable to assume that a similar fee was part of the £70 to £80 charged by R B Bate mentioned in Contemporary Comment, 1825, EQM p 2252.

Notes & Queries

N & Q 140 — From P BESSEY

I found this scale in a local antique shop here in Illinois. The owner purchased it in the UK and brought it back. I understand that the goods pan is on backwards.

Most of the scale appears to be made from wrought (hammered) iron, with the pans of copper. There is a verification plug under the name AVERY below the fulcrum. I cannot make out what was stamped onto the plug. I understand that Avery did not start manufacturing scales until 1817, so I assume that fixes one end of a possible range of dates.

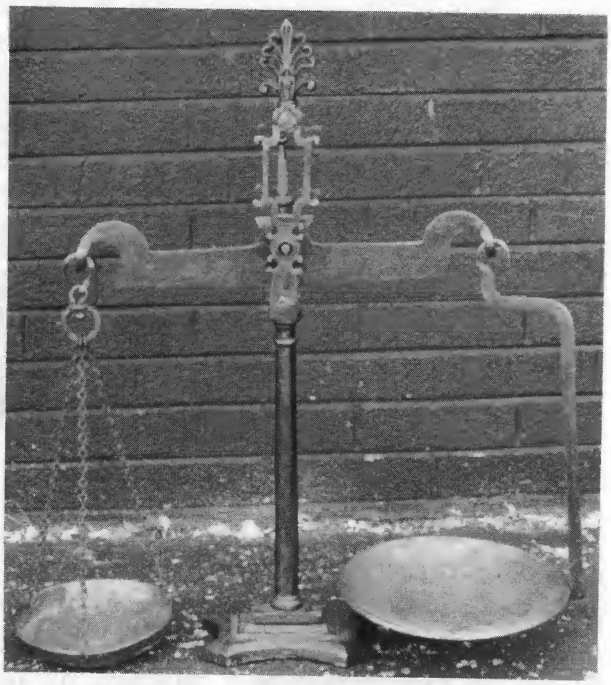
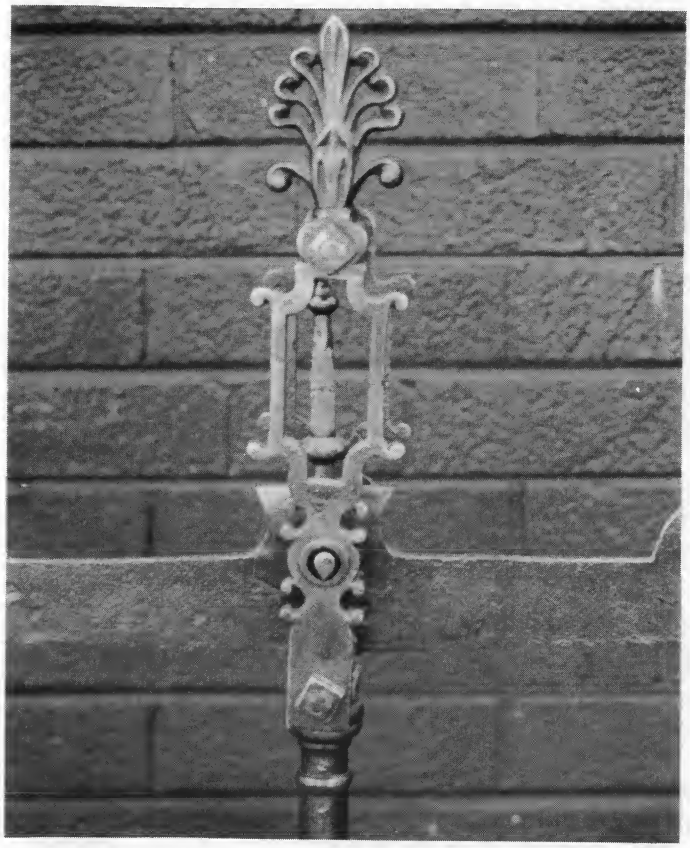


Fig. 1. W & T Avery Stand Scales, with ornate top.

N & Q Reply — from the editor

I had never seen this design of scale before, and so I had to go through my catalogues. It was not in Avery's 1830, 1850, 1862 or 1880 catalogues, all possible dates for that style of scale. But there it was, in the 1885 catalogue, giving us proof of cost, variations and approximately the first date. If a design was popular, Avery's would go on making the same design for many years, but this design was not in the 1898 catalogue, so we must assume that it didn't sell very well.



Personally, I think is a superb design, and quite as attractive as some that they did make for 40 years. It is a pity that it has been sand-blasted, removing all the black paint with its red and gold high-lights, but I expect it had got dilapidated. The article on sight-hole shears in EQM, 1586-1590, shows two scales of similar function and decoration.

Yes, the goods pan should give free access for the right-handed person putting goods onto the pan, so the hanger should be reversed. The weight-pan was always on the left.

Fig. 2. ≺≺ The shears are held together by crude nuts, yet Avery's picked them out in gilt (see the illustration from the 1885 catalogue on page 2336.)

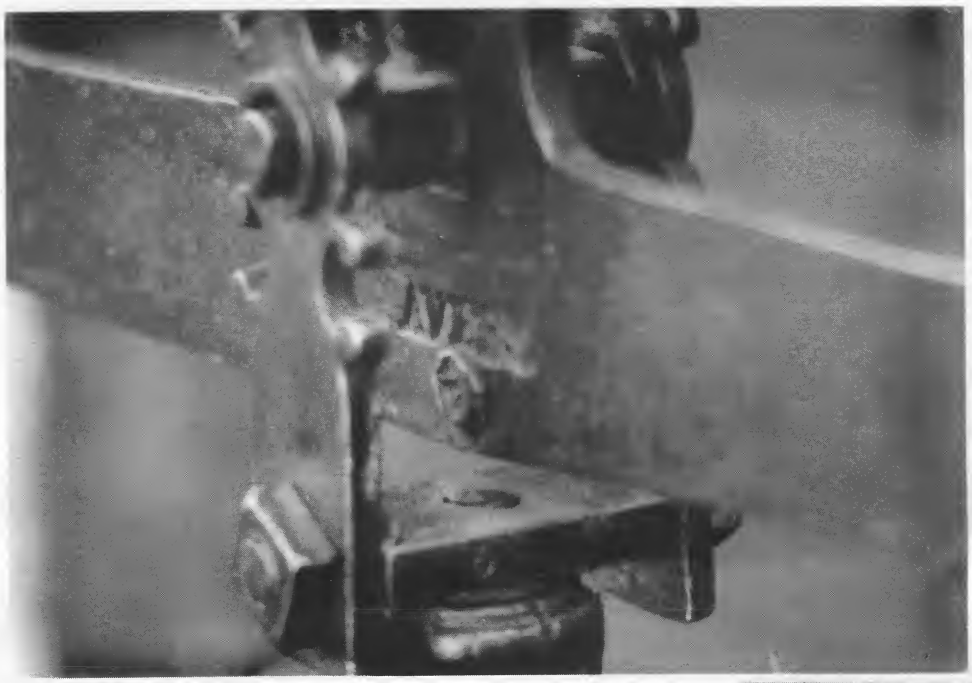
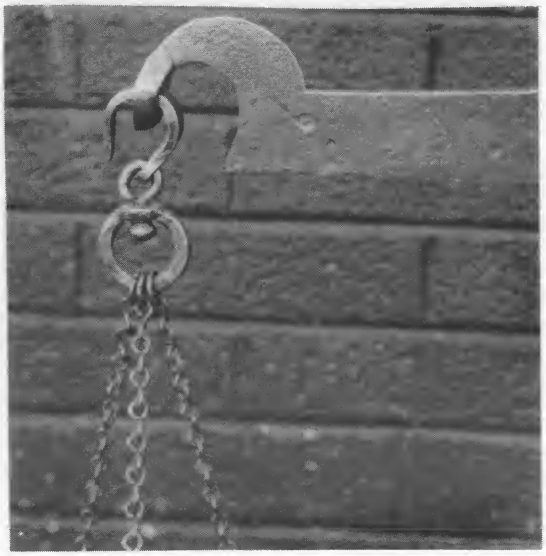


Fig. 3. ≺≺ The copper plug under the AVERY stamp is very characteristic of scales and weights of this period. Biggs discusses these plugs in his book *Antique Weights*, on pages 48, 49 and 76.

Note the dove-tail joint used to insert the pointer into the beam, a feature usually concealed by the paint.

The pippin-steel knife-edge is in an exceptionally protruding bearing of hardened steel.

Fig. 4. ≻≻ The circular fixing with the swivelling-hook in its top was called a 'bright ball' by Thomas Beach in his catalogue of the late 18th century. See EQM, page 1541, which shows the bright ball and two of the variations that the painters applied to the iron beams.



The use of copper for the pans suggests that the scale was used for dry goods, rather than for butter or cheese. I remember sugar being weighed out in a blue paper bag on a similar scale in the grocers' shop during my childhood.

The plug of lead could either be innocent of stamps, if it was never used in trade to sell goods, or the lead could have been stamped with an asterisk to obliterate the last stamp, on the grounds that it was no longer accurate enough for trade use. Or it could have been incompetently stamped and difficult to read.

STRONG COMMON STAND SCALES

Beams	16	18	20	22	24	26	28 ins.
With tin scoop & chains & painted beam	17/-	18/3	19/9	23/-	28/-		
With shovel-shaped tin scoop, gilt beam, iron crank & chains	20/6	22/-	24/-	28/-	35/-		
To weigh	½	¾	1	1½	2	pecks	
With square copper or brass pan turned up at the back, crank painted beam & chains	21/6	23/3	25/-	29/-	36/-		
With square iron pan turned up at the back, crank painted beam & chains	16/-	17/-	18/-	21/-	25/-		
With concave round pan copper or brass, painted beam & chains	16/-	17/-	18/-	21/-	25/-	30/-	36/-
With concave round pan copper or brass, painted beam & chains	19/-	20/-	21/-	24/-	29/-	35/-	42/-
With hammered & polished scoop copper or brass, gilt beam & chains	24/6	26/6	28/6	32/-	39/-		
With china round plate & links, painted beam	17/-	19/-	20/-	23/6	27/6		
With china round plate & links, gilt beam	20/6	22/-	23/-	26/6	31/6		
With nickel plated cranks	1/6	1/6	1/9	2/-	2/6	3/-	3/6 extra

Fig. 5. ≺≺ Text of 1885 Avery catalogue p 57. Note that the first two versions were offered with very large scoops which were defined below in peck capacities. Note how expensive the gilt beam was, compared with the price of a painted beam. As both were done by the same craftsman, using a brush, the additional cost must have been due to the great cost of gold, and its liberal use on the ornamental top, to make the top match the beam.

Fig. 6. ≺≺ W & T Avery 1885 catalogue. STRONG COMMON STAND SCALES. Japanned and Painted or Gilt, Wrought Iron Beam, Steeled Knife Edges, Cast Iron Pillar and Foot, Steel Bearings, Plain Bright Iron Cranks; Copper Weight Scale, balanced with lead; Brass Chain or Links.

Note that it was uncommon in 1885 for a British scale company to specify exactly what was to be weighed on any particular scales, but some guidance as to what it was sensitive enough to weigh might be indicated;- provisions, confectionery, bakery, cheese, fruit, flour or potatoes. Once the system of Class A, B, C, (followed by Class 1, 2 and 3,) was mandatory, the shop-keeper just ordered the scale he liked the look of, making sure that it was of the Class that he required. This made life easier for the compiler of catalogues, as he no longer had to use terms such as *very sensitive* (Class A), *improved common* (Class B), *hucksters* (Class C), and later, *not for trade use* (so rough and ready no inspector would pass them).

These scales were quite simple to make, having only about 24 parts, but even they needed many different skills, casting, blacksmithing, chain-making, raising (from flat to hollow), tube-rolling, potting, plating, finishing, painting and adjusting. These craftsmen were backed up by warehousing, packing, delivery, accountants, printers, salesmen and repairmen. No wonder it is devastating to a town when a company goes elsewhere or shuts down.

Contemporary Comment, 1783

Rex v. St. Nicholas, Gloucester,[1] 17 May, 1783.[2] from A J CRAWFORTH

The mayor and burgesses were possessed of a house in the parish of St. Nicholas in Gloucester, and erected a machine in a street by the said house for weighing waggons, carts, &c., for which they received 2d. per ton for what was weighed there,[3] but persons were not compellable to weigh their carriages &c. The steel-yard, part of the said machine, was in the said house, which was called the engine-house; the house, exclusive of the profits of the machine, was worth £5, and the profits worth about £40 a year; the mayor and burgesses were rated "for the machine-house £24; £1 16s."[4] *Per Lord Mansfield, C.J.* The nature of the thing shews that the machine is annexed to the freehold; they are one entire thing, and are together rated by the common known name (the machine-house), which comprehends both. The steel-yard is the most valuable part of the house; the house therefore applied to this use, may be said to be built for the steel-yard, and not the steel-yard for the house; the clear profits are undoubtedly rateable, but a liberal allowance ought to be made for wear and tear, labour and attendance- *Willes, J.*, said, if the machine be appurtenant to the building, its clear profits are undoubtedly rateable. If a billiard-table stand in a house, and the house should, in respect of such a table, let at a higher sum, it would be rateable, while the table continued there and was so let, at the advanced rate. Rate affirmed.

Notes and References

1 Chitty, *Burn's Justice of Peace and Parish Officer*, vol. IV on the Poor Laws, London, 1831.

2 *Caldecott's Reports, 1776-1785*. The date of this case was found by G Moore, Bodleian Law Library, Oxford.

3 Why did the mayor and burgesses set up the platform steelyard? Was it part of their responsibilities for the smooth-running of the market? Was it a public service? Was it a money-making venture? Why did waggon-owners want to know the weight of loads?

4 The normal rate in 1831 for a business of rateable value of £24, was 24 shillings, but this owners of this property had to pay 36 shillings (£1..16s). The reason for this is not apparent, unless the rates due were altered between 1783 and 1831.

ISASC

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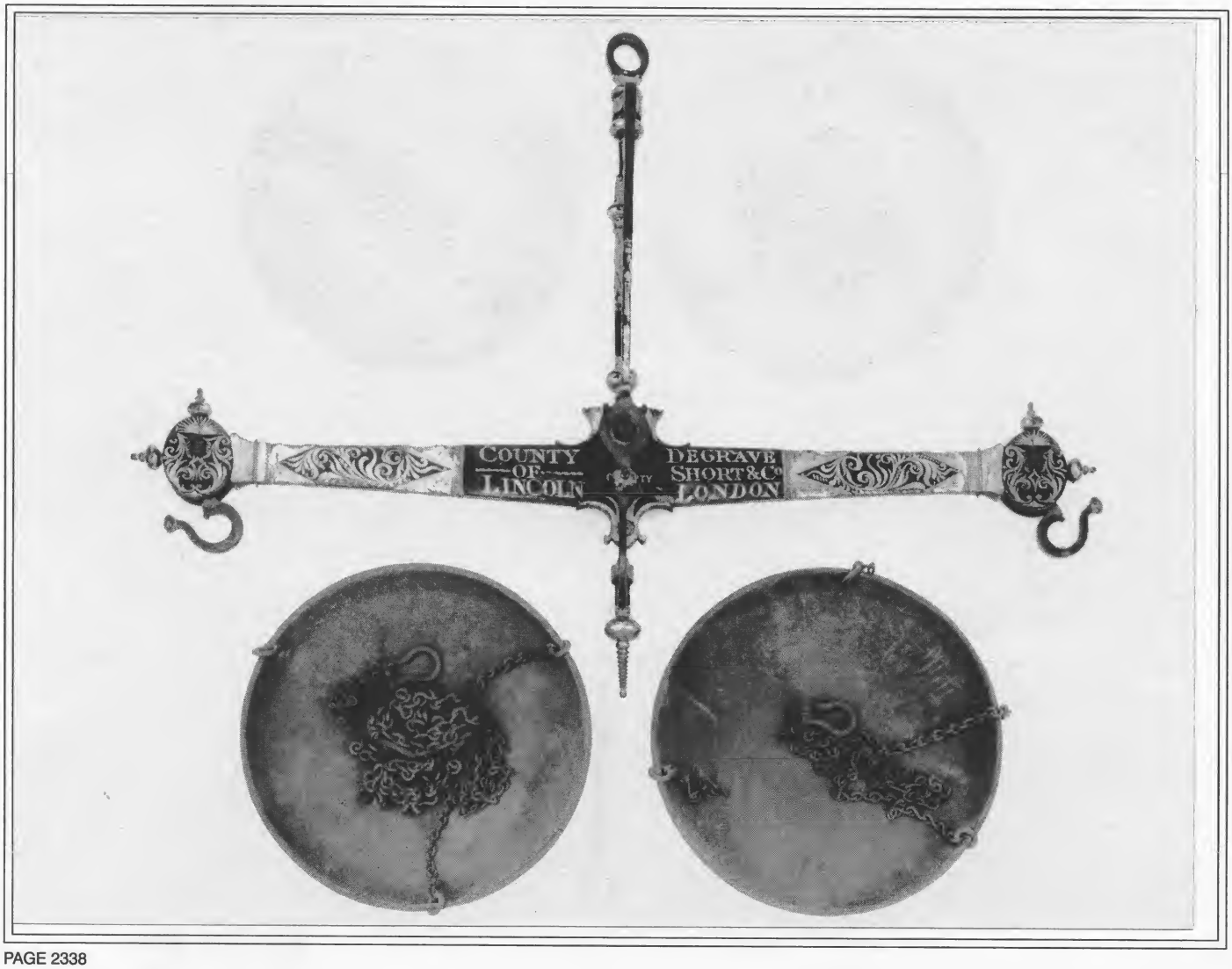

Cover Picture -Indoor Beams

Following *Oertling Verified Unequally?* (EQM 2260-2265), *Inspectors' Outdoor Beam Kit, 1910* (EQM 2265-2267) and *Response on W & M Kit* (EQM 2331), it is interesting to consider the beams used indoors by British inspectors. The previously-mentioned scales were sometimes used indoors at the temporary weigh-stations, but because they had to be taken out of the main office they were categorised as "Outdoor Beams", whereas the scales shown here were kept indoors at all times, and were not carried about.

As the indoor beams were stationary, they could be less rugged and have more delicate knives, to make them more precise. The one illustrated on the cover was sensitive to 30 grains with 100-lb. in each pan; the one in Fig. 2 was sensitive to 5 grains with 100-lb. in each pan with a beam 28 ins (610mm) long.

The example made by DeGrave, Short & Co (Cover picture) for the County of Lincoln is virtually identical to the example made by Thomas Cheshire in 1892 for the Corporation of Manchester (EQM 91). The only obvious way of differentiating the DeGrave indoor beam from the Cheshire outdoor beam (if the travelling container is lost) is by looking at the worn patches part-way along the beam. The DeGrave paint is immaculate, whereas the Cheshire paint was worn through to the iron where the pans had grated during journeys. Even this clue may be unavailable if the box was particularly well fitted, and the paintwork preserved.

It seems odd to us that the figures show beams that were probably made more or less at the same time, the first being in the traditional style, and the second in the latest style. The second beam has incorporated continuous steel knife-edges, is made of gun-metal, has sight-hole shears (by no means

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new, but definitely easier to read accurately), rigid hangers that permit easier loading and unloading of the pans, and a slot in the centre boss so that the beam can be dis-assembled easily without damaging the fulcrum.

The beam on the cover probably hung in a tripod above the head of the inspector without any means of relieving the knives, whereas the second had DeGrave's foot action relieving gear. The photograph shows the pedal depressed and the pans swinging freely, but the catalogue of 1910 shows the pedal up. The pressure needed to lift a beam loaded with 100-lb. in each pan must have been very great.

The 1910 catalogue states *For use in suspending 56-lb. and 100-lb. beams, and is to be preferred to a tripod for indoor use, as by the use of this stand the pans are held steady during loading and there is no unnecessary wear of the knives and bearings, and also weighings are executed more quickly and accurately.*

Fig. 2. ⩙ DeGrave & Co, London, c.1900.
Christie's South Kensington, 29 May, 1997, no. 37

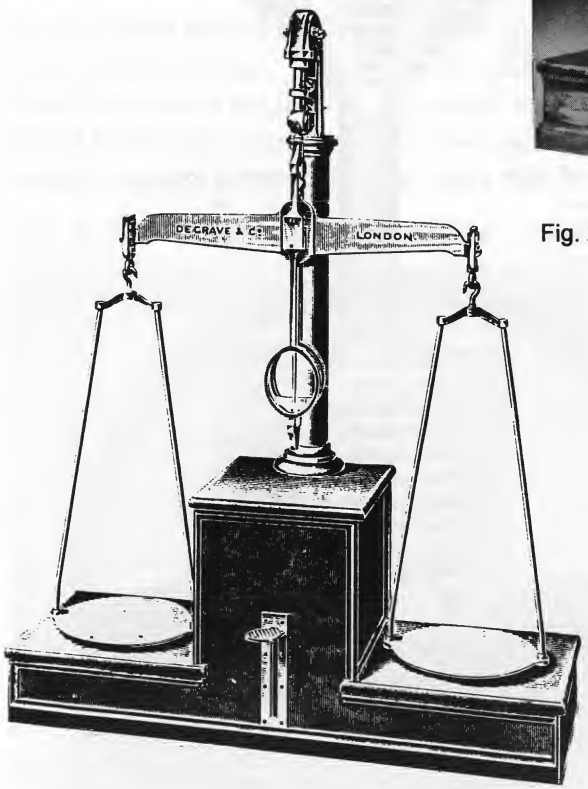


Fig. 3. ⩙ DeGrave, Short & Co. 1910 catalogue, relieving gear for beams with foot action, for 28 ins beams. The base is about 36 ins (880mm) across. Note the downward pointer and sight-hole.

DeGrave also made relieving gear that operated by turning a handle half-way up the pillar mounted on a box. *When loaded with 56-lb. in each pan, a pressure of less than 2-lb. suffices to turn the handle and put the beam into action. This is obtained by lowering the pan-rests which support the load and without raising the whole weight as is the case with other relieving apparatus. Although worked on the pan-rest principle, the pans are quite close to the ground, an important factor in rapid weighing and saving labour.* Just have men with strong backs!

Cover picture: auction of 18 November 1993, no. 131. Thanks to Jeremy Collins and Tom Newth of Christie's South Kensington.

The Evocative Scale Queen

BY G WEHMAN

What is it about these little paper weight/letter scales that is so intriguing? Judged by the styling, and confirmed by the 1949 patent date, they aren't old enough to be called antiques. Yet from the first time I saw one, I've been unable to resist buying as many more as I could find. Buying Scale Queens is like eating salted peanuts; nobody ever stops at one. And that certainly qualifies these intriguing desk accessories to be considered collectibles.

The Scale Queen is a novelty variation of the well-known candlestick spring scale sold for household use.[1] But it leads a double life. At first sight, it's an aluminium paper weight. When you unscrew the conical cap, up pops a stem graduated 0 to 8, the units not specified, but in ounces and half ounces. By inverting the top and pressing it onto the stem you have a letter scale, just the right size for your desk. Surprisingly, this convertible feature has never been copied by another maker. Some collectors refer to the Scale Queen as the "airplane scale" because of its resemblance to the exposed cylinders on World War II era airplanes. Others have called it the "pyramid scale," although the conical top is not, strictly speaking, pyramidal in shape.

CONSTRUCTION

The "Scale Queen" is machined from solid aluminum bar stock, then highly polished to a satin smooth finish. The base is of sturdy plastic, available in attractive colors.

Made by engineers and adjusted to give accurate weight to match postal requirements. It should not be necessary to regulate the adjustment screw (located at bottom of base) at any time.

Fig. 1. AA The reverse of the advertisement for the Scale Queen.

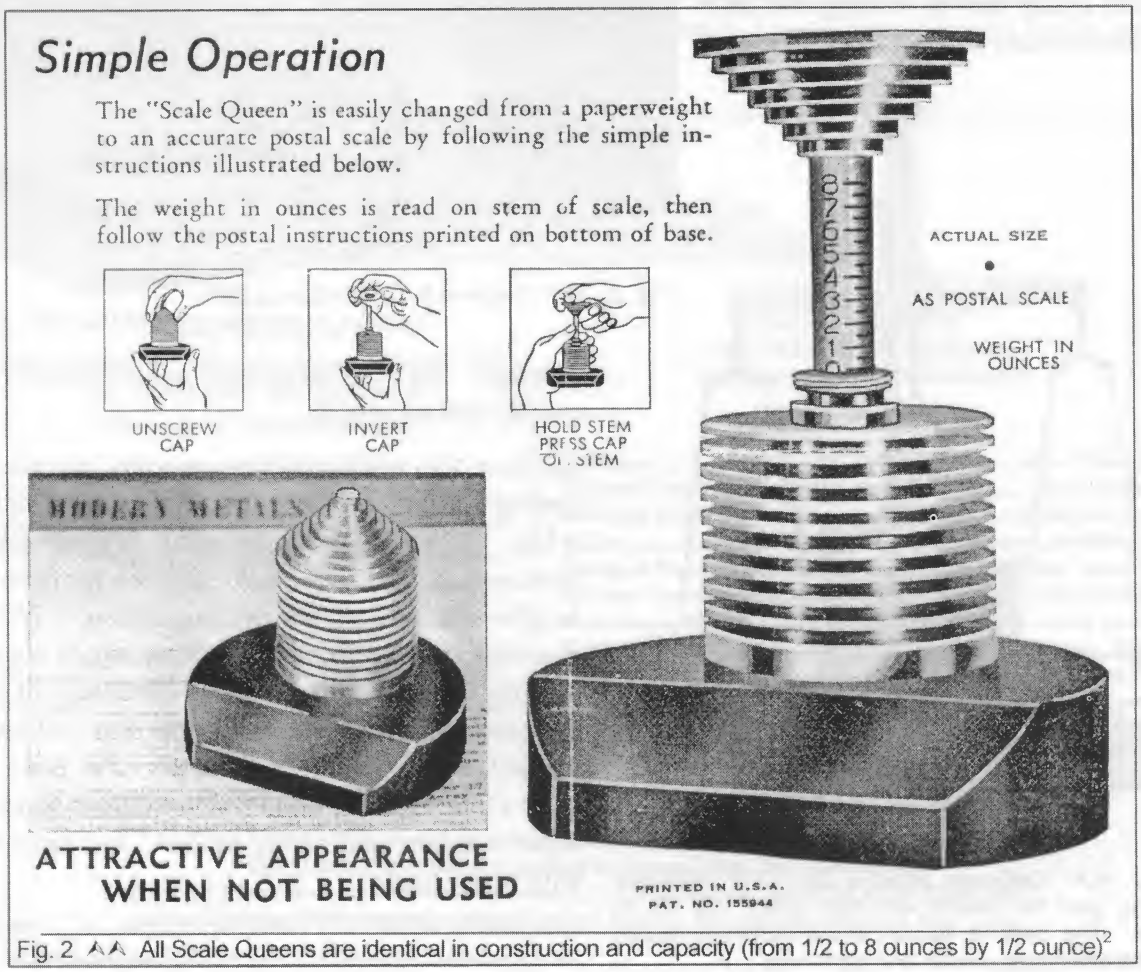


Fig. 2 AA All Scale Queens are identical in construction and capacity (from 1/2 to 8 ounces by 1/2 ounce)[2]

Fig. 3. ➢➢ The two identical scales in the rear illustrate both the paper weight position and the letter scale position. Neither displays any advertising. Each came with the circular and the one on the left was still in its original black and silver box.

The scale in the foreground has a dark brown plastic base with the advertising stamped in gold: THE WILLIAMSON HEATER CO, Cincinnati 9, Ohio, REdwood 1343.

Photo P Wehman

Each of them has the inscription: *Mfd. by Thompson Engineering. & Mfg. Co., Chicago Ill.* embossed on the plastic bottom.[3] Many, but not all, have postal charts pushed into the bottom. All of them have a bevelled face at the front of the plastic base to display an advertising message. Only a few have been found without the imprint. I have two such blank fronts, Bob Stein has one, and Betty Wright has one entirely covered in brown leather. Jerry Katz has seen only one, and Bill Doniger thinks he saw one.

The earliest postal rate charts on the scales without any advertising (apparently sold directly to individuals for their personal use) say specifically, *Mfg. by Thompson Engineering & Mfg. Co., Chicago Illinois*. Charts apparently printed later insert the postal zone "47"after Chicago. At least one chart has no reference to the maker, and one reflects a change in the maker's name: *Thompson Tool and Mfg. Co. Chicago 47, Illinois*. These scales are valued primarily for their rarity.

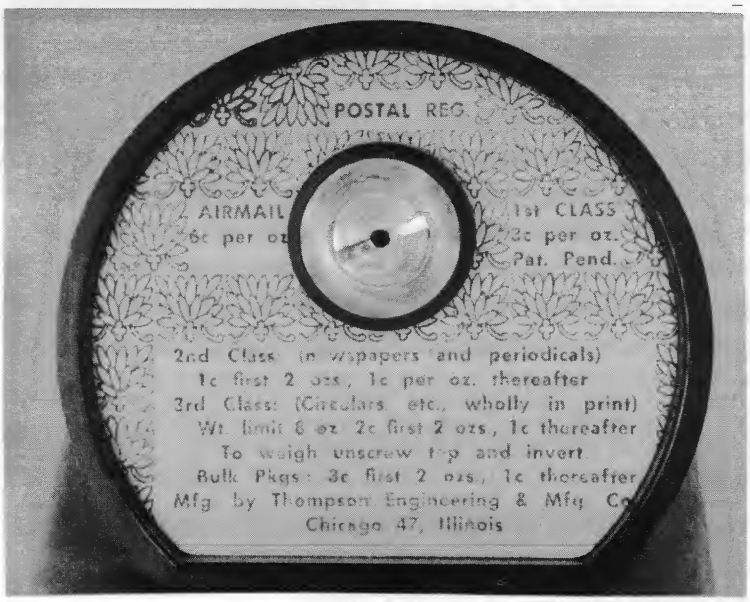


Fig. 4. ⩙⩙ These postage rates were in effect from the mid-1940s at least through 1957.[4]

Photo courtesy J Katz

Nearly all Scale Queens were sold as advertising give-aways, with postal rate charts identifying the distributor as *The Kemper-Thomas Company, Cincinnati, Ohio*, a dealer in office accessories. Bob Stein has the only known example

Fig 5. ∀∀ Companies that ordered Scale Queens with their own name on the scale.

Arctic Office Mach. Co.
433 E Anchor St. , Ph. 41513
Anchorage Alaska

Dick Ells Steel Co.*
908 VeniceBlvd., L.A. 15
Richmond 7-5129

Hampshire Paper Box Co.
Florence, MASS.
Phone Northampton 51

Holmes -Talcot Co., Constr. Equipment
Chapel 6 -1601
Htf'd CT

The Kemper-Thomas Co., Cincinnati, Ohio

The Kemper-Thomas Co.**
Cincinnati 12 Ohio
Sample No. 2190

LoMar's Pharmacy,
1100 Davis St.

Newco Fibre Company

Parrish Transfer Line
120 Mero St.
Frankfort
Phone 1953

Pleasant Ridge Service
24320 Woodward at Main
Lincoln I - 9327

Tel-e-lect Products
Minneapolis 16, Minn.
Phone HO 8246

Thomas & Riggs

The Williamson Heater Co
Cincinnati 9 Ohio
REdwood 1340

* Pat Pend; Mfd by Thompson Eng & Mfg Co, Chicago 12 Ill
** This scale was shown by company salesmen to prospective buyers.

marked *Thompson Tool and Mfg. Co.*

These are scales that capture the imagination. Each of them evokes the flavour of an earlier time, when 'phone calls were placed by speaking to an operator or dialing a number with a named prefix that indicated a particular district of a certain city. Advertisers' addresses may omit the city entirely or include one- or two-digit codes dating from 1943. The postal rate charts remind of us those halcyon days when first-class mail went for three cents an ounce. The variety of firm names and locations shows that the scales were marketed from Massachusetts to Alaska.[5]

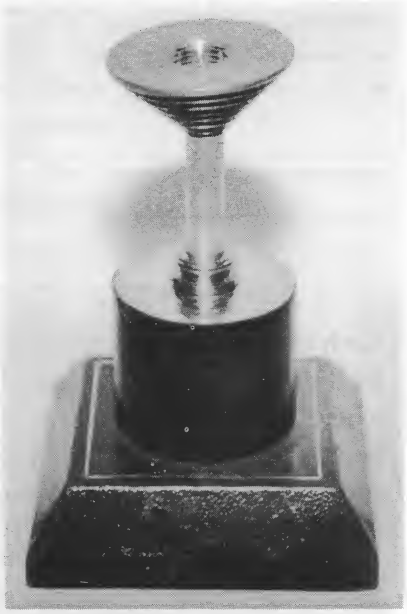


Fig. 6 Scale Queen completely covered in brown leather except for the conical top. Stamped in gold on the leather-covered bottom: LoMar's Pharmacy, 1100 Davis St. Photo courtesy B Doniger

When were the Scale Queens made, and when were they sold? The Patent Office records indicate that Arnold M Thompson and Melvin D Thompson submitted an application on March 3, 1948, and were issued Design Patent No. 155944 on November 8, 1949.

All of the Postal Rate Charts are clearly marked Pat. Pend. That information ought to date the scales rather precisely. But the imprint on at least one advertising scale shows the abbreviation "CT" rather than "Conn." for Connecticut. Two-letter state abbreviations were not introduced until the 1960s, long after the patent was issued and the postal rates shown on the chart had become obsolete. They could have been made in large numbers in 1948-49 and sold over a long period of time, or they may have been manufactured later by someone who never thought to examine the postal rates shown on the charts. Recently, collectors have paid from $10.00 to $100.00 for one.

No city is mentioned, but the Davis St. address may well indicate San Leandro, CA, where it was purchased. [William Heath Davis, a pioneer merchant and shipowner married the heiress of the Estudillo family whose Spanish land grant encompassed much to what is today San Leandro.]

Scales like this would have been ordered by pharmacists as gifts to the physicians whose prescription referrals were important to the firm's success. The leather covering , with the donor's name placed discretely on the bottom, provides a desk accessory worthy of a doctor's office.

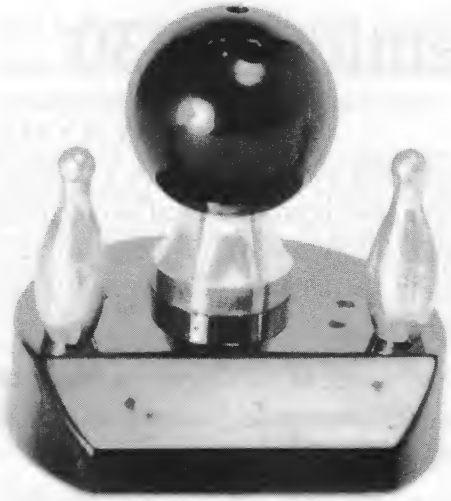


Fig. 7. ⩓⩓ The bowling ball, also made of black plastic, has the customary two finger holes plus a third hole between the two, which fits over the stem when the scale is in use. The bowling pins and stem are aluminum. Total height of the scale in storage position is $2^{7}/_{8}$ inches.
Photo P Wehman

Although primarily a scale collector, I have several other small collections that are not scale-related. One of these is antique toy bowling sets and individual game pieces or pins. I collect only the wooden ones that are interesting in shape, size, or exterior finish.

On one special occasion my husband Phil gave me a beautifully wrapped box. Opening it, I found a small plastic base with a plastic bowling ball in the centre of it. On each side of the bowling ball was a metal bowling pin. I was speechless. I did not know whether I should laugh or cry. This object was not compatible with my collection of wooden bowling items.

When he suggested turning the bowling ball, I discovered that the top half of the the ball could be unscrewed. As I removed the top, a metal post with graduation marks on it rose from the bottom half of the ball. When the top of the ball was inverted I discovered that it would fit on top of the post. I had a unique postal scale!

What a delightful surprise it was. So.... You never know what you might find in a bowling ball.

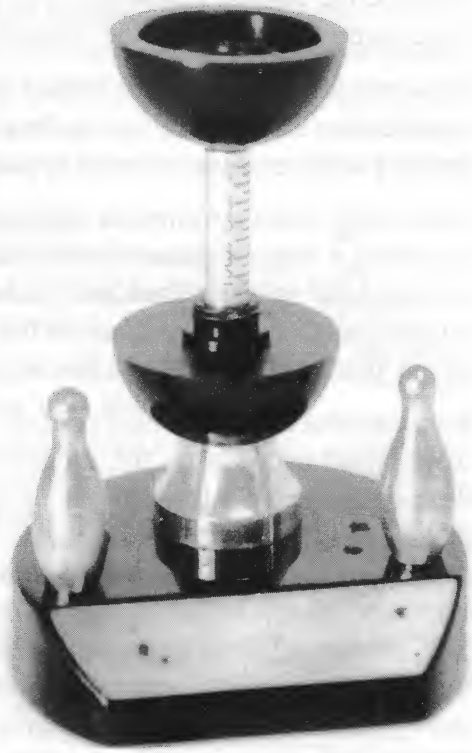


Fig. 8. ⩓⩓ This scale is functionally identical to the others, and was made during the same time period. The plastic base is the same size and bears the same logo: *Mfg. By Thompson Eng. & Mfg. Co. Chicago ILL. Pat. Pend.* There is no advertising , and the rate schedule is missing.
Photo P Wehman

Acknowledgements
Information for Footnotes 4 and 5 was supplied by Megaera Ausman, Historian, U. S. Postal Service Museum. Thanks to W Doniger and J Katz, both of whom did special photographic sessions for this article.

Notes and References

1 Crawforth, M A, *Handbook of Old Weighing Instruments*, 15, 16 Fig. 6.

2 At the suggestion of our editors I tested several scales and found them to be accurate up to four ounces, adequate for letters. Above that amount they weighed about 5% light, but could be corrected with the adjustment screw.

3 The editor has one with THOMPSON ENG. & MFG. CHICAGO, ILL. PAT. PEND. cast underneath.

4 The postal rates on the chart were in effect from the mid-1940s through at least 1957.

5 The one- and two-digit postal codes were instituted in May 1943, in part as a means of making it easier for inexperienced mail clerks to sort mail. (Many of the more experienced clerks were serving in the Armed Forces.)

ZIP Codes were instituted on July 1, 1963, accompanied by recommended two-letter state abbreviations. Most addressing systems of the day had only 23 spaces, and the two-letter state abbreviations vacated space for the five digits in the ZIP code.

In October, 1983, ZIP plus four-digit codes were implemented.

My mnemonic aid for all this is that there was a change every 20 years. In each case the addressing changes were recommended to, but not required of, the mailing public.

Thaddeus Fairbanks' Invention, 1830

Part 3 - What did Fairbanks invent?

BY A YALE

Henry Little's account of the origins of the first Fairbanks scale conflicts with the company's version.[1] Therefore the records of the United States and British Patent Offices have been examined to determine what patent claims were made by Thaddeus and Erastus Fairbanks. Unfortunately, it is not possible to examine the earliest Fairbanks' U.S. patents because the records of the United States Patent Office were destroyed by fire in 1836. However, there is an 1833 British Patent available.[2]

The same year as the fire, the United States Congress passed the Patent Act of 1836 revising the patent regulations. For the first time inventors had to prove originality, furnish a model, and pay a fee. The British parliament also amended its patent law in 1835 or 1836.

The United States government attempted to reconstitute the patents lost in the fire by inviting inventors to submit a copy of patents issued prior to the fire. An "X" in front of the number indicated these reconstructed patents. Thaddeus Fairbanks did supply the Patent Office with copies of a patent he held on a diving-flue stove, number X8763, but an examination of these reconstructed patents did not turn up any patents pertaining to scales issued to Fairbanks.

It appears that E & T Fairbanks did not re-establish their prior patents on weighing machines.[3] Instead, they revised their claims, for, on February 10 1837, E & T Fairbanks received seven patents, Letters Patent Numbers 118 through 124. From these patents, one can determine that Fairbanks held patents relating to scale design dated June 13 1831; February 21 1832; September 22 1832 and March 6 1834. A mimeographed copy of a summary of Fairbanks patents, apparently prepared by a Fairbanks employee, identifies the lost Fairbanks patents as X6573 (June 13 1831); X6941 (February 21 1832); X7225 (August 22 1832)[4]; and X8046 (March 6 1834).[5] The June 1831 and February 1832 patents were cancelled in 1834 as defective and a revised patent was issued in March 1834. In 1837, the March 1834 patent was cancelled as defective and revised as Letters Patent 118, 119, 122, 123, and 124. The Sept. 1832 Patent was split; part reissued as Patent 120, while the remainder was revised as Patent 121.

The exact claims of each of these new patents were examined to determine what the Fairbanks still considered patentable in 1837. They were then compared with British Patent No. 6479 to determine whether they coincided and, if not, how they differed.[6]

It should be noted, when examining a patent, that the bulk of the text is a description of the innovation in the larger context. The only relevant part is the explicit claims made at the end of the patent, usually preceded by the phrase *I claim* or *We claim*, with a brief description of the claims of originality by the patentee(s).

Patents 118 and 119 of 1837, both entitled *Improvement in the machine for Weighing Heavy Bodies*, are the residue of Fairbanks original scale patent of 1831. Both carry the following note: *For which Letters Patent were granted, dated June 13, 1831, and subsequently canceled on account of a defective specification, and new Letters Patent granted, dated March 6, 1834, which*

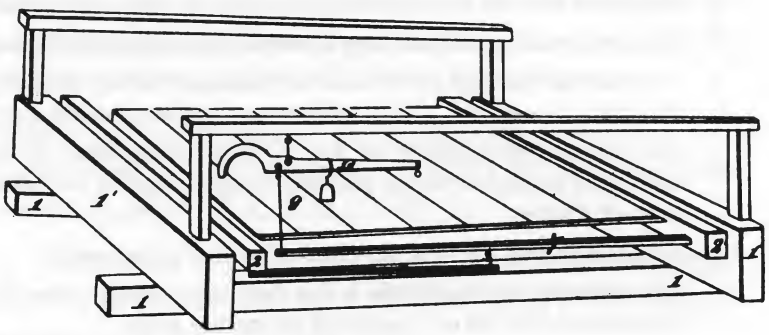


Fig. 1. AA Patent 118 of 1837.

new Letters Patent are hereby canceled on account of a defective specification. These two patents are what the Fairbanks brothers still claimed as originally their earliest patent for the Fairbanks scale.

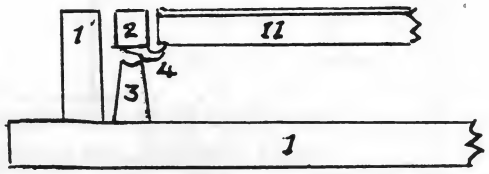


Fig. 2. ⩙ Detail of Patent 118 showing the 'hinge' **4** between the wood **2** and **3**.

Patent 118 claims *the knife-edge hinges .... and the pieces denominated 'rockers'* to which they are attached (see Fig. 2.) A hinge (**4** in Fig. 2) is a piece of metal that incorporates both the fulcrum pivot and the load pivot for the levers. Four hinges, one at each corner of the platform, provide stability to the platform, but it is imperative that the distances between the knife-edges (pivots) are identical on all four hinges. The hinges are mounted on the bottom of two *rockers*, heavy wood timbers that went the entire width of the scale. The fulcrum pivot of each hinge rests in a groove on an iron post that the Fairbanks called the *fulcrum*. The other knife-edge of each hinge received the load from one corner of the platform.


Fig. 3. Hinge in patent 118.

This agrees with British patent 6479's claim of *the construction of that part of the machine denominated the rocker*. The description of the hinges in Patent 118, which in patent 6479 are referred to as *bearing arms*, may fall under Patent 6479's *the construction of the joints with their knife edges*, although the latter may also include the knife edges that join the two levers. The use of the word *joints* in the claim is troublesome as it is only used in the description to refer to the part shown in Fig. 3 which is a variation of the hinge which is *suspended from the frame surrounding the platform.*[7]

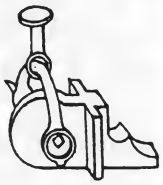


Fig. 4. Joint in British patent 6479.

The load is transferred via the rocker (**2** in Fig. 1) to a single lever attached to one end of each rocker. At this point the load from both rockers is transferred to a single, longer lever as described in Patent 119 which claims *the employment of two levers connected together at a point equidistant from their axes or at the point of their relative power, in combination with two pair of knife-edge hinges or bearings whose knife-edged are on parallel lines.* (See Fig. 5.) The short lever $\mathbf{a^2c^2}$ is attached to one rocker and a long lever $\mathbf{a^1d}$ is attached to the other. Points **a** represents the fulcrum, points **b** represents the load . Point $\mathbf{c^2}$ on the short lever hangs from point $\mathbf{c^1}$ on the long lever such that the distance $\mathbf{a^1c^1}$ is equal to the distance $\mathbf{a^2c^2}$. Point **d** hangs from the steelyard. The mechanical advantage of this lever system is the ratio of the distances **ab** to **ad**.

While patent 6479 has no description or claim for this configuration of levers, it does make a claim for *the manner of arranging the levers and attaching them to the rockers* that is covered in US. Patent 122.

Patents 118 and 119 suggest that the Fairbanks were aware of other precedents for the invention of the platform scale, as nowhere do they claim originality for a ground-level platform, or for the use of compound levers under the platform. They also appear aware of other designs, for they claim that their design, in which *the knife-edge bearings being all on parallel lines, the friction and cramping which*

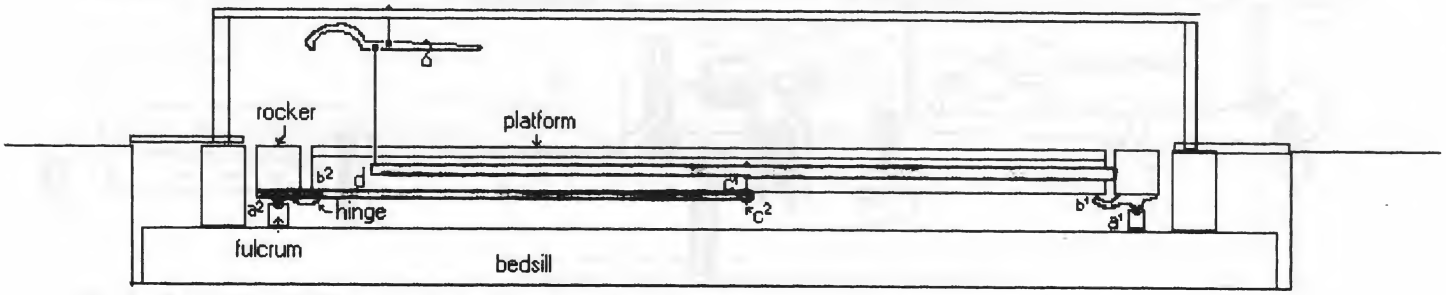


Fig. 5. ⩙ Patent 119 lever system. Close up on next page.

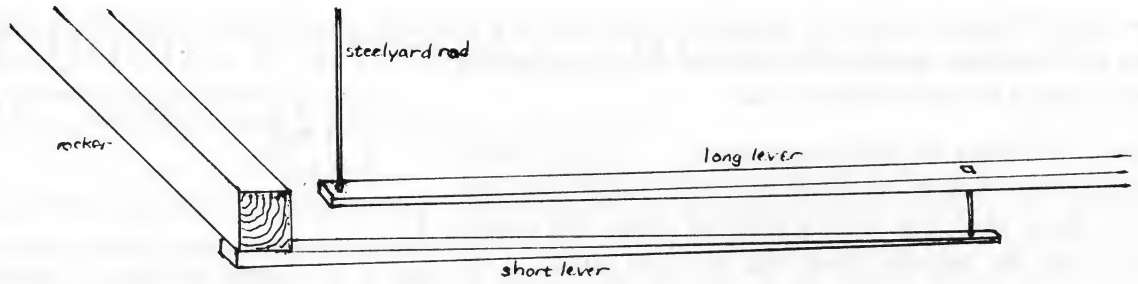


Fig. 6. ⩓ Detail of drawing with patent 119 of 1837.

would result from an oblique position of the knife-edge is avoided[8] implies that they claim their design is superior to some other design. An examination of the diagram in the 1797 Encyclopaedia Britannica illustrates a lever system in which the knife-edges are not parallel.[9] See **11** in Fig. 2.

If the two-lever scale shown in Patents 118 and 119 represents the second generation Fairbanks platform scale, it was apparently a dead end.[10] The use of only two levers in conjunction with *rockers* was soon abandoned as subsequent platform scale designs had at least four levers, as we will see in Patent 122.

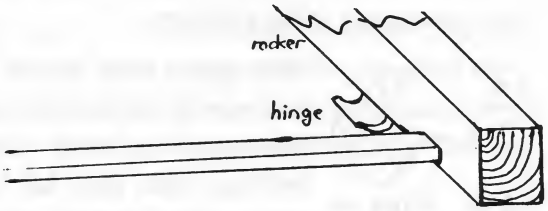


Fig. 7. ⩓ Hinge and rocker with patents 118 and 119 of 1837.

Patent 120 represents a re-issue of part of a patent issued September 22, 1832. It involves a modification to the weighbeam for *the double purpose of obtaining an exact counterpoise to the platform, and of putting the beam into equilibrium.* This is done with a balance-ball, a cylindrical poise with a threaded hole which is screwed onto a threaded rod attached parallel to the weighbeam. By screwing the ball toward or away from the fulcrum of the weighbeam, the weighbeam can be brought into equilibrium when the platform is empty. While balance-balls were eventually placed behind the load pivot as in Fig. 9, the illustration for patent 122 suggests that Fairbanks brothers originally placed it toward the power end of the steelyard beam. See Fig. 8 [and EQM 220, fig. 3].

This invention is important for it allows easy adjustment of the weighbeam to compensate for differences or changes in the weight of the platform or levers. The balance-ball became a standard feature of the weighbeams of platform scales. This claim is identical to 6479's claim for *the use of the adjustable weight **f** upon any part of the beam.*[13]

Patent 121, a revision of part of the patent dated September 22, 1832, claims *the combination of the use of the graduated weights.... to be suspended at the end of the beam indicating the hundreds and thousands of pounds, with a movable poise traversing the arm of the beam and showing the intermediate pounds.*

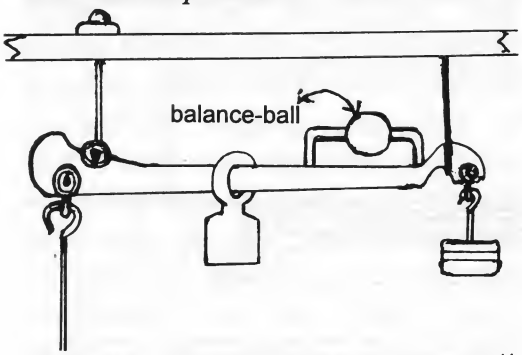


Fig.8. ⩓ The balance-ball as in Patent 122[11]

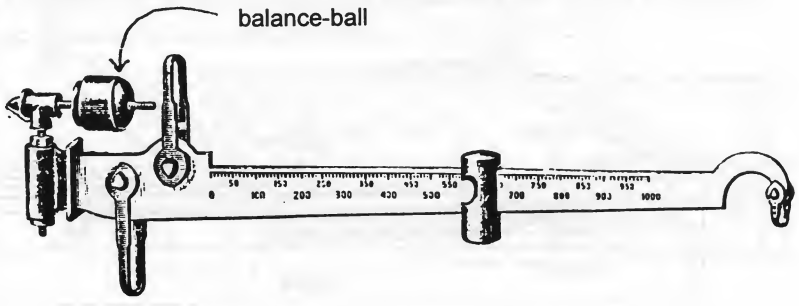


Fig. 9. ⩓ More common configuration[12]

Fig. 10. ≺≺ Proportional weights, (poises) to slot on the hanger.[14]

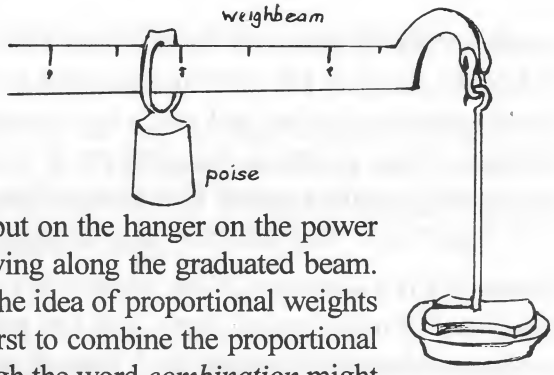


Fig. 11. ➢➢ Proportional weight and counter-poise as used in 1891.

This statement refers to the use of proportional weights put on the hanger on the power end of the weighbeam in conjunction with the poise moving along the graduated beam. It isn't clear whether Fairbanks claim to have originated the idea of proportional weights hanging on the counterpoise, or just that they were the first to combine the proportional weights with a moveable poise on the weighbeam, although the word *combination* might suggest the latter. While this feature is described in Patent 6479, it is not included in the claim. This may suggest that combining a movable poise on a graduated beam with proportional weights hung from the counterpoise was already in use in the British Isles.[15]

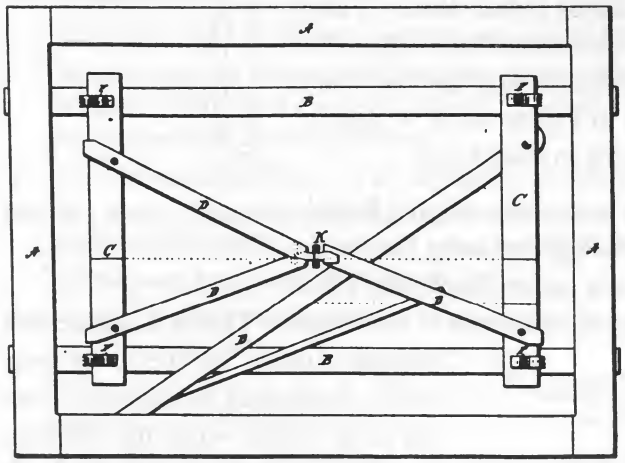


Fig. 12. ⩓⩓ Patent 122 of 1837.

Patent 122 provides for a different configuration of levers than specified in Patent 119: *the arrangement being that of having the longer lever (with its rocker) triangular, extending through the center of the machine, and the shorter lever, while it forms but one power, is constructed with two arms so fitted as to be suspended to the longer lever at a point equidistant from the axis of each, thus preserving the simple combination of two levers, as claimed in our former patent.*

Although the *rocker* is used in this patent, it is much less massive and no longer serves the purpose of transferring the load from two pivots to a single lever. Eventually, when the pivots are attached directly to the levers, the rocker would diminish to the function of a bracing between levers. This patent covers a transition from the two-lever system to the more conventional system of one lever per load-point. A similar claim is made in the British Patent 6479.

While the hinges in Patent No. 122 look similar to those in 119, they are flipped over so that the *hook* rests in a groove on the fulcrum and the platform rests on the load pivot. Figs. 13 and 14 contrast the manner of attaching the hinges in Patents 118 and 122.

Patent No. 123 claims *(t)he mode of obtaining a vibratory motion in the supporting power by means of the standard* ***EE*** [see Fig. 14] *which are used instead of the fulcrum 3, which we used in our first*

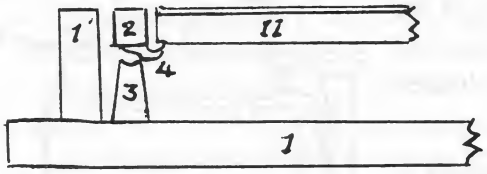


Fig. 13. ⩓⩓ Patent 118.

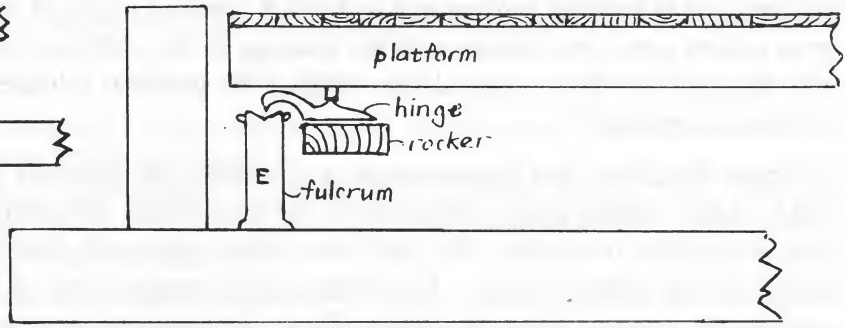


Fig. 14. ⩓⩓ Fulcrum of Patent 123 of 1837.

patent. This standard was an iron post with a groove on top which supports the fulcrum of a lever. While the standard **EE** looks quite similar to the fulcrum in Patent 118, the fulcrum in Patent 118 was fixed solidly to the bed sill while the standard **E** can vibrate back and forth a bit so as to prevent binding of the pivots as the platform is loaded or unloaded. The use of the word *standard* and designating it with a capital **E** in British Patent 6479 indicate that that patent is the revised fulcrum of U.S. Patent 123. This reference to a vibratory standard **E** was used as early as Dec 30, 1833.[16]

Patent 124 is a *variation in the manner of connecting the two levers in the center, (whether they be composed of one or more parts each,) to wit: by means of knife-edges resting in pendulous rings or circles, as shown in drawing No. 1, letter **K**, and drawing No. 2, Fig. 6 and Figs 3 and 4, letter **J**.* Each lever has a pivot bolted to it, and these are linked with an iron ring. This patent represents another innovation that became a standard feature of platform scales.

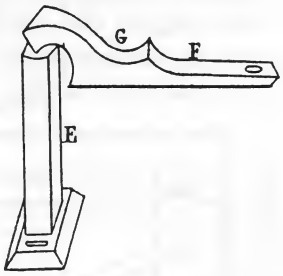


Fig. 15. AA British patent 6479 of 1833.

Patent 6479 spends considerable space describing how the two levers are connecting, but whether this is covered under the claims is less clear. It may come under *the manner of constructing the joints with their knife edges*, but this is speculative. It should be noted the system for connecting the two levers and hanging the long lever from the steelyard rod in Patent 6479 is slightly different from the two systems described and illustrated in Patent 124.

Except for this variation in the means of connecting levers, the original British Patent 6479 as described in April 1834 sheds no new light on early Fairbanks claims. However, a memorandum of alteration to this patent dated July 1836 introduces a completely new claim that is not in any of Fairbanks U. S. Patents. This is a feature that became known as the *drop-lever* which disengages the platform from the lever system when the platform is being loaded or unloaded, *in order that the various bearings and connections shall not be injured by the friction caused by placing heavy goods upon the scale and removing them after they have been weighed.*[17] This is accomplished by suspending the steelyard from the short end of a lever **B** in Fig. 17.[18]

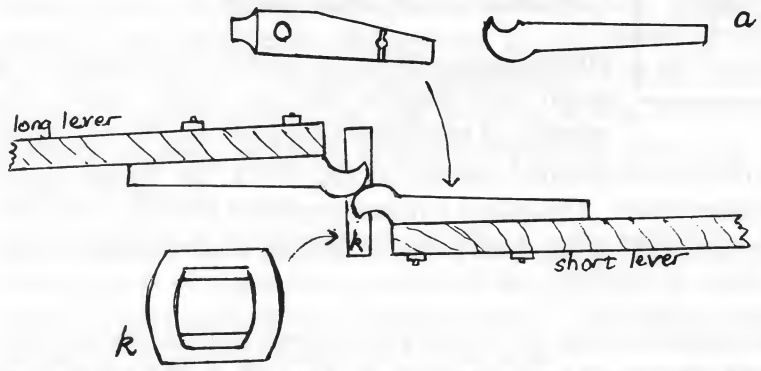


Fig. 16. AA Connecting levers using pendulous rings in Patent No. 124 of 1837.

When the long end of this lever is raised, it lowers the steelyard, the steelyard rod, and the lever system. This allows the platform to rest on the sides of the scale frame. When the long end is lowered and secured by hook ***b***, the load pivots of the lever system come into contact with the bearings of the platform, and raise the platform free, so that all the weigh of the platform is loaded on the lever system.[19]

A further *disclaimer and Memorandum of Alteration* was proposed in 1843. After making minor alterations to the description, the claims were completely re-written. The first three claims are merely clarifications of the earlier claims. The fourth claim appears new as it includes the use of a frame or timber sills in the construction of the

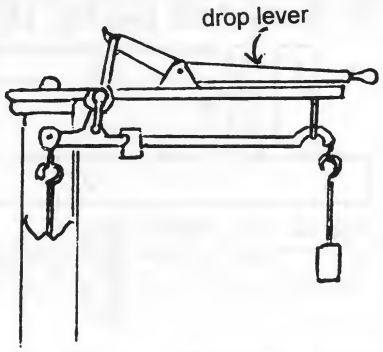


Fig. 17. AA T Fairbanks patent 205,623 of 1878, showing the drop lever.

platform itself. The fifth claim merely incorporated the alteration of 1836 dealing with the drop-lever.

Conclusion

While the above mentioned patents included many innovations that became standard features on platform scale, it is clear from these patents that, by 1837, E & T Fairbanks must have recognized that they had no claim to the invention of the principle of the platform scale. In none of these patents do they explicitly claim to have invented a compound-lever platform scale.

Notes and References

1 See Parts 1 & 2 in *Equilibrium* pages 2283-2286 and 2326-2329.

2 In British patent 6479 there is no mention of the name Fairbanks. It is issued to Miles Berry, *being a communication from a Foreigner residing abroad.* However, the description and illustrations are identical in most ways to Fairbanks patents discussed in this paper and there is a letter dated January 9th, 1834 from Thaddeus Fairbanks to Thomas Jones, their American patent attorney, which mentions *Mr. Berries letter* in the context of British patents and wants to get some scales to London *before the specifications are enrolled.* (Vermont Historical Society, Fairbanks papers, 1386) This British patent includes a *Memorandum of Alteration* dated 1836 and a *Disclaimer and Memorandum of Alterations* dated 1843.

3 While it would be desirous to find copies of the earlier patents, this paper is based on the claims of the Fairbanks brothers' 1833 British patent and 1837 U.S. patents. Any claims the company made after that date are subject to the interpretations herein proposed.

4 This date apparently refers to the September 22, 1832 patent.

5 The mimeographed list was located in the archives of the Fairbanks Company in St. Johnsbury, Vermont. If copies of any of the reconstructed patents still exist, the author was unable to locate them on his several visits to the National Archives in Washington, D.C.

6 A small problem which occurs in comparing the American and British patent is that some scale components are called by different name in the two countries.

7 Patent 6479, sheet 2, fig. 7. The illustration of the rocker and bearing arm assembly in Patent 6479 is almost identical to the illustrations in U. S. Patents 122 and 123.

8 Letters Patent Numbers 118 and 119, dated February 10, 1837.

9 See *Equilibrium* 694.

10 The first generation being the "platform, balanced upon two bearings in the center of the lever" described in Equilibrium 2284-5.

11 There was no illustration accompanying Patent 120. Therefore we used the ball-balance illustrated in Figure 3 of Patent No. 122.

12 *Illustrated Price List of Fairbanks Standard Scales*, 1891, 57.

13 British Patent 6779, page 6, line 29-30.

14 *Illustrated Price List of Fairbanks Standard Scales*, 1891, 96.

15 Ed- Proportional weights were used in conjunction with a moveable poise by Wyatt in 1744 (*EQM* p 658). They were shown in the *Encyclopaedia Britannica of 1797* (*EQM* p 694) and designed by Trotter with a subsidiary poise within the poise at the end of the 18th century (*EQM* p 696).

16 A letter sent to Thomas P Jones from Thaddeus Fairbanks, dated 30 December 1834, Vermont Historical Society, Fairbanks Papers, no. 1421.

17 British Patent 6479, page 8, lines 21-23.

18 Image from U. S. Patent 205,623 dated July 2, 1878 which deals with an improvement to the drop-lever scale. There was no illustration of this feature in British Patent 6479.

Ed- Pooley (British holder of rights to make Fairbanks' scales) stated, in the 1907 catalogue, *...drop levers, by which the platform is raised with its load to be weighed, and immediately after weighing lowered, when the outer edge rests upon a frame forming part of the warehouse floor.*

19 Ed- Relieving gear was already in use under British platform scales. Thomas Bourne illustrated the handle of the gear clearly in his advertisement of 1829 (EQM p 697). Could Fairbanks have been patenting a new way of relieving?

Contemporary Comment

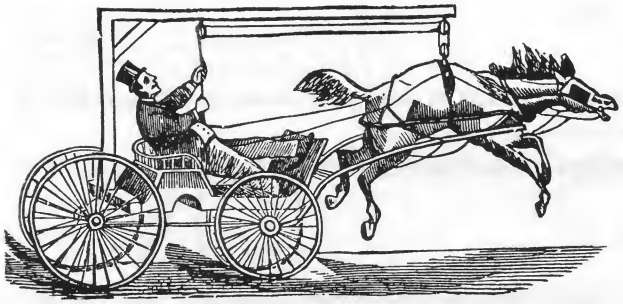
SENT BY V DENFORD

Text and pictures taken from a catalogue of Jones of Binghamton, c.1882.

FAIRBANKS SCALE.

It was patented, and as long as money could do it, the patent was re-issued and extended, by one device and another, until the inventors had weighed into their coffers millions of money. The inventors' accounts were long since balanced, and they are suceeded by a mammoth corporation - one of the great monopolies of the age - who own railroads, steamship lines, and transportation companies, and have their own warehouses in every large city in the world. Princes of royal families of Europe have not the money to support the elegance and luxury of the stockholders of this giant monopoly.

Their dividends one year were over sixty per cent. From where did all this money come? These millions are the difference between a fair business profit and the amount that could be got under the protection of a patent, in the hands of an unscrupulous monopoly. It is said that money can do anything - but the time came, at last, when money could not further extend the patent. They were about as much surprised as this old horse.



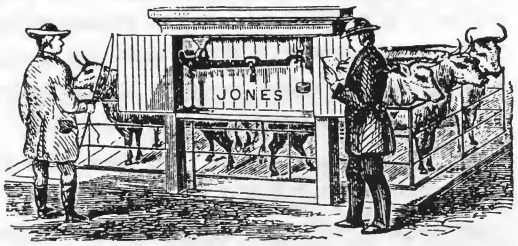
When they found that JONES of Binghamton, and everybody else, had a *moral* as well as a *legal* right to make GENUINE FAIRBANKS SCALES, Judge Taney, of the US Supreme Court, settled this matter when he ruled that "The papent having become public property, the value of a Scale made upon the principle embraced in the patent, must be determined by the quality of the material used and the skill employed in its manufacture. A good Scale is one that will weigh *correctly*, and wear as long as can be insured by the use of the best stock. Any Scale that fills these conditions is just as good as any other Scale, and it is no better than FAIRBANKS on the beam than it is with JONES at half the price.

The Fairbanks Scale having been decided by the most eminent scientists to be the best combination of levers and fulcrums, to secure accuracy in action with convenience in form, JONES of Binghamton, as well as some dozen other companies, adopted this principle, and made genuine Fairbanks Scales - *genuine*, because they are on the exact principle invented and patented by Fairbanks.

JONES of Binghamton has, from time to time, modified and improved the construction without sacrificing the original principle, until he has, all things considered, the

BEST SCALE IN THE WORLD!

AT THE STOCK YARD.



Among its prominent merits are: *Simplicity of Construction* - never getting out of order; *Durability* - warranted to wear longer than any other Scale; *Strength* - secured by placing every ounce of metal where it would do the most good. All the *wearings* and *bearings* are of THE BEST TOOL STEEL, combining toughness, hardness and permanency of edges. Our cast and wrought irons are of the strongest brands. The beams are brass, and of the finest quality, and every detail of the manufacture is executed by the most skillful workmen. All this, combined with the low price at which THE JONES SCALE has always been sold, has secured it a place in the minds of the people as the most

POPULAR SCALE.

More than Twenty of the Best Years of the Life of Jones of Binghamton has been devoted to convincing the public that there is no royal family of scale makers, and that one man can make just as good a scale as another if he has the same material and the

"know how". The old monopolists have grown so arrogant, with their millions stolen from the people (selling a scale at ten times its cost comes "dreffel" close to stealing), that they assumed that none but a Fairbanks had a right or knew enough to make a scale. Still, the public have decided that JONES of BINGHAMTON, and many other scale makers, make better scales than Fairbanks, for the reason that they have to be more careful, to meet the critcism to which they are subjected. 'Tis an old saying, "*Get a name for early rising, and you can lie abed all day.*" The public don't care a copper whether "Smith, Brown, Jones or Robinson" makes the scale, so that it is durable and weighs correctly. The fools who are willing to pay from $10 to $100 for having "Fairbanks" on the beam, are growing scarce.

Notes & Queries

N & Q 141 — From V JONES

Over the years I have found these little flat brass objects in boxes I bought on the continent. They appear to be a series, but the decorative oval marks on any one do not match those on any other. Are they weights? If so, what were they used to weigh? The largest one weighs about ¼oz. or 7.5grams, as far as I can ascertain with my scales.

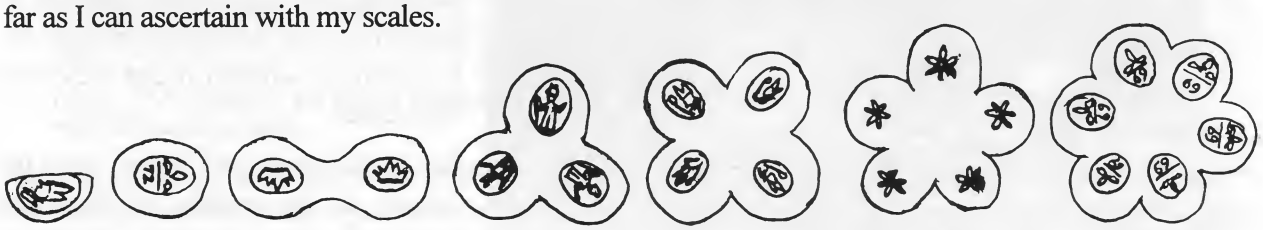


Fig. 1. A sketch of the apothecary weights. Drawing by V Jones

N & Q 141 — Reply from the editor

You have some apothecary weights, probably made in Milan in the 18th or 19th century. The oval marks are verification marks put on by inspectors. My Italian is non-existent, so my comprehension of Borzone's book *I Pesi Monetari di Monete non Italiane* [see footnote 1, EQM 2356] is extremely limited. I did not expect to solve your problem in a book on money weighing, but there are a few illustrations looking just like your objects.

The verification marks are shown in the companion book by Mazza, *I Pesi Monetari di Monete Milanese*, [see footnote 1, EQM 2356] but without dates, as far as I can see. I am astonished that an inspector would fiddle about putting a matching set of marks neatly into each lobe, but all 24 examples shown are equally nicely decorated. A credit to Italian aesthetics!

Checking in Vangroenweghe and Geldof's book, *Pondera Medicinalia*, three examples are shown, one with marks showing a Bishop with his crozier, (Ambrosius) and one with a star and crescent mark. The six-lobed one weighs 7.30 grams, so must the six denari weight. [The denaro was one scruple, and three denari were equal to one dram.] So the six denari could be called two drams.

Notes and References

Vangroenweghe, D, & Geldorf, T, *Pondera Medicinalia, Apothekersgewichten, Apothecaries' Weights*, published by the Centre for the Study of Apothecaries Weights, Evert van't Padstraat 55, 8310 Brugge (Assebroek), Belgium, 1989. The most useful and comprehensive reference book on the development and variety of European apothecary weights, written in Netherlands, English, French and German with 156 figures, showing hundreds of weights in fine detail.

A Scale Collector in Italy

BY B BRASS

Loreto Apretino is an ancient Italian village perched high up on a hilltop in the central province of Abruzzo. The castle, previously derelict, is the centre-piece of the district and visible for miles around. At great Euro-dollar cost it has recently been converted into a magnificent hotel. The hotel stands, like its predecessor before it, peaceably contemplating its subjects as they hustle and bustle in the narrow alleyways below.

The guide-book effusively describes Loreto Apretino's mediaeval attributes, its historic collection of ancient artifacts and the beauty of its venerable church. The village, a miracle of survival, no longer has to protect itself from marauders and has spread into the lower plains. It represents the best that Italy has to offer in its unique combination of art and history, seemingly untouched by past turbulence.

On the plain stands the church, built in the early 12th century, still decorated by the remains of a fascinating fresco which will appeal to those who understand the important position held by the symbol of the balance in the development of religion and art. The fresco depicts an angel weighing the souls of the departed as they cross over the bridge into heaven, to determine whether or not they were fit to enter.

Fig. 1. AA The west wall of the church of St. Maria in Piano at Loreto Apretino, Pescara, showing the remnant of a superb fresco, with God in Glory at the top, and the judgement of souls at the bottom. Compare with EQM pages 1609-1613. Photo B Brass

Set in the plain still lower than the church, in the middle of farm-land cultivated with geometric precision, lies one of the most unusual restaurants in the region. Here the gastronome who is also a scale collector, is in for a treat. The restaurant is called *La Bilancia.*

The diner is greeted by a grand open hall filled with local diners obviously enjoying Nicola Sergio di Zio's cuisine. There are artifacts dotted around the premises, nearly all with some sort of scale connection. Paintings, metalware, a plaque from Toronto, Canada, calendars, ceramics, clocks, medals and certificates (all complimenting and honouring the cooking abilities of di Zio), - each one a testament to the general collecting zeal of the owner. Nicola is a member of the noteworthy Chevaliers du Chefs (but, sadly, not of ISASC; at least, not yet!)

Fig. 2. ⩓⩓ Detail of the fresco showing the scale with trumpet-ends and shears with a tab at the top, by which the scale is held. Photo B Brass

There are several steelyards (seemingly local trade scales; remember this is a farming area), modern letter scales, several Salter-type spring balances, a chemical balance of unknown origins, and, on a high shelf in the entrance hall, a large (milk?) scale. (The only other scale of this size and type I have seen was in the collection of the late Morton Wormser of the USA.)

In total, Nicola says that he has about 50 scales of many different origins and types. I am sure that there were more, but a very slight excess of the amber liquid, the lateness of the hour as we departed, and an unfulfilled promise to return on the next day, all conspired to prevent our having more than a brief discussion.....

And we had eaten well!!

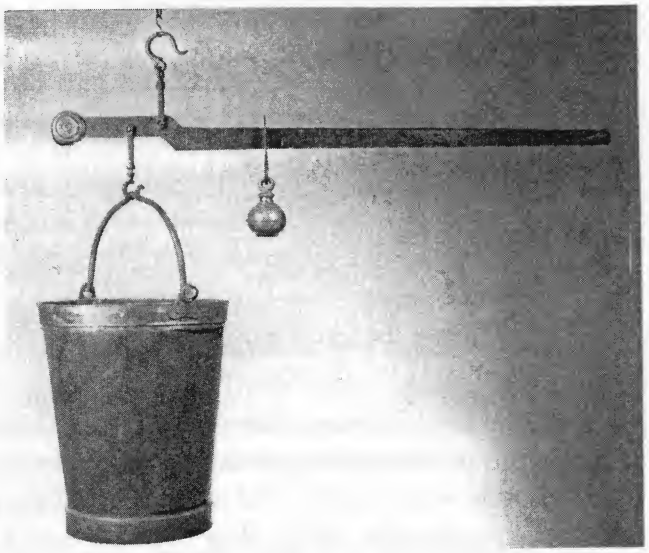


Fig. 3. ⩓⩓ Italian milk scale. Iron steelyard with a brass counterpoise and a brass roundel on the short arm, a very characteristically Italian decoration. Made by Demetrio Baccarani of Campogalliano in the early 20th century. Many Northern Italian steelyards combine the use of two metals in a most satisfying decorative way. Note also the handsome hooks, another Italian speciality.
Lent to the Museo della Bilancia, Campogalliano by the heirs of D Baccarini.

Review

De oudste Muntgewichten uit de Nederlanden 1300-1600 by G M M Houben, published by the author, 1998, ISBN 90-70533-07-3, available from Weteringpark 7-30A, 8025 AM Zwolle, Netherlands.

This is the ninth booklet in the series written and published by Gerard Houben. The subject being specifically Netherlands, he had every justification for writing it in his own language, but this makes it difficult for those of us outside his country. Hence, this small review must be accepted as totally inadequate, but is intended to give some guidance to non-Netherlands speakers.

The area covered includes Brugge, Ghent and Antwerp, gives lists of their coins, and illustrates most of their weights used between 1300 and 1600. Being such old (and well-used) weights, a few of the illustrations give only a vague idea of what was originally on them, but the vast majority of the pictures are still immensely useful and interesting. The ten illustrations of trade labels are the most exciting part of the book for me, being the labels of Cornelis Claesz, Gerdt Genss, Hierosme Verdussen, Vincent Casteleyn, and Hans van Breda. If only the English had such superb early evidence!

I recommend all collectors of coin-weights to have this book available for reference. D F C-H

DeGrave, Short & Fanner?

BY A J CRAWFORTH

A folding gold balance came onto the market recently, with an abnormally large poise, so big that the box could only be closed if the poise was turned towards the fulcrum. The hanger was missing, but the general design was so average as to be typical of several makers' work. When a hanger was "borrowed" from another folder, tests proved that the original hanger had been a pennyweight heavier than normal, presumably to take a large gold coin. The hanger descended with a £3.12 on it when the turn was away from the fulcrum, with a 36/- when the turn was towards the fulcrum, and, when an 18s weight was put onto the hanger, an 18s coin could be tested. The presence of an 18s weight was deduced by trying various weights in the slot in the box.

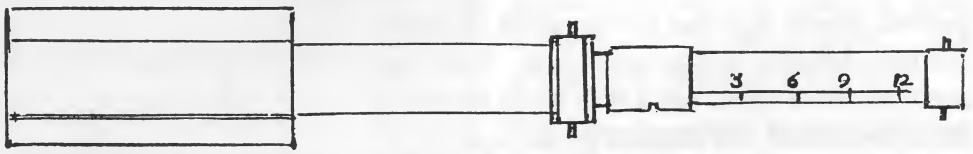


Fig. 1. ^^ Drawing round the top-view of the folder. Numbers indicate pennies-worth of gold lost.

All this was immensely exciting, as no examples of folders for the "Joey" had appeared previously. The Portuguese piece was current before the Great Recoinage of 1774-76, and few people would have wanted to weigh *just* those coins after 1776. So was that this folder made before 1776?

But the label says *DeGrave, Short and Fanner*, a partnership started only in 1845. Surely nobody had such a hoard of Portuguese pieces that they went out and ordered or bought a folder specially so long after the coins were around? Yet the label had been printed especially to go in a folder. Had the folder been in for repairs after 1845? Why bother to have it repaired? Suggestions please!

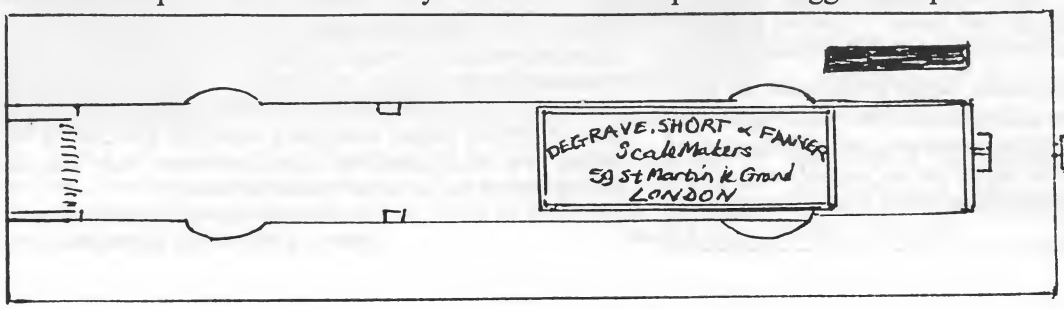


Fig. 2. << Wide mahogany box, slot for extra weight (18s?), shiney blue paper lining.

Review

London Apprentices, volume 21, Founders' Company 1643-1800, and **London Apprentices, volume 22, Armourers' and Braziers' Company 1640-1800**, both by C Webb, published by the Society of Genealogists, 1998, each priced £8.00 plus 50p for packing and postage in GB, available from 14, Charterhouse Buildings, Goswell Road, London, EC1M 7BA.

Two of a series compiled to a standard format, these books list alphabetically all apprentices found in the Company, name and address of the apprentice's father, (or the name of his father's Company if he was a citizen of London), the name of his master and the date of binding.

The author intends eventually to compile the Blacksmiths' Company apprentices, but probably not for about two years. He omits (due to shortage of space) the trade and addresses of masters, even though they were, for short periods, included in some company books. He was handicapped by the loss or damage done to some Company books, but has made optimum use of rough drafts, freedom books and Court records.

The author is to be congratulated on the Index of masters, the Index of places and the Index of trades and occupations, making these books accessible, interesting and useful. D F C-H

Response, Town Weighbridge BY A RANGELEY

Contemporary Comment 1783, (EQM 2336), Footnote 3.

The 'platform steelyard' was, in fact, a cart weighbridge, usually 12-14 feet in length and 6-8 feet in width, and its use, as intimated, was the weighing of carts and waggons. One can visualise the haywain (shown in Constable's 1821 painting), being mopped out, loaded and driven onto such a weighbridge.

The reason for installation was for the machine to be available for public use and was a chargeable service to be provided to cover the expense of the capital outlay, the maintenance and a profit. The modern-day term is a 'public weighbridge', and they are still prevalent to this day throughout the United Kingdom.

The reason for weighing is the age-old one - trade and commerce, which has been carried on since pre-biblical days. The farmer would bring his cart-loads of produce, such as turnips, potatoes, straw, hay and corn, to market. To assess the value it was necessary to weigh the load in order that he could calculate the price.

In my collection of weighing ephemera, I have several old weighbridge tickets dating back to 1800, covering the above commodities and which also include coal. These tickets were issued by the weighbridge operator, very often a local authority, and a charge made according to weight. For example, in June 1848 the charge for seven weighings in that month was three shillings. One ticket was even for a load of dung, another for a load of bark.

With the advent of the Industrial Revolution, manufacturers bought their own weighbridges, but the need for public weighbridges still remained for the use of small producers.

To digress slightly, certain Markets in England even had their own Standard weights and measures apart from their own public weighbridge. I possess the Standard bronze bell-weights from 56-lb. to 1-lb. engraved with the Indenture no. 868 below a large crown, and round the base '*Bury Market, County of Lancaster 1840'*, (illustrated in Ricketts *Marks and Markings of W & M of the British Isles*, p 31).

Turin Coin-scale, 1821

The Italians lived in small States, sometimes as colonies of countries such as Spain or Austria, or with independent rulers, until unification in 1861. Each State had its own coinage, and the coins circulated over a wide area of what is now Italy, Austria and Southern France. Within the States, coins from many countries were common currency, so coin scales were needed with many weights.

This set is immediately identifiable as from Turin because the large flat box (9½ins, 236mm, wide and 5½ins, 137mm, from back to front) has a serpentine front and chamfered corners at the rear. The weights are rectangular, not round, as in Milan, (see EQM 2352-2356), and the 6 inch brass beam has up-swept arms with double-hole ends. The grain-locker lid slides into the recess for the pans, so has survived. There are, additionally, 'pennyweights' for 24, 12, 6, 3, 2 and one denier, more useful than the sets provided in Milan that only went up to 8 deniers. Most of the weights have been verified.

The authorised printer in Turin usually put the name of the scale-maker on the label, but, in this instance, the maker, Giovanni Battista Messerano, has put his name on in manuscript; "*Pio Batta Messerano, Fabricatore da Pesi da Oro ed ogni qualita in Biella, [18]21*". Biella is a small town in Piemonte, mid-way between Turin and Milan, but the style is firmly Turinese. When the Turin area was part of the French empire the printers used labels written in French, but the weights were stamped with their Italian names.

The weights are given in deniers, grains and granotti, the value in Piemontese lire (Turin being in Piemonte), and the value in Francs and cents (Napoleonic money), for the gold coins of Piemonte, Franzia, Genova, Milano, Spagna, Portogal, Venezia, Firense, Roma and Raspone, (Piemonte, France, Genoa, Milan, Spain, Portugal, Venice, Florence, Rome and Raspone).

Present owner not known. Sold by Numismatica Wien in 1974 in one of the most interesting coin-scale auctions ever held.

Milanese Coin Scale-Boxes in 19th C

BY G ZAVATTONI

This short article does not attempt to deal with the history of Milanese coin weights. For descriptions and pictures it is advisable to use the three comprehensive catalogues of the collection of the Numismatic Department of the Milan City Museum, by Mazza and Borzone.[1]

For our purposes it is sufficient to remember that Milanese weights were of round form [monetiform] and that they were produced and sold under governmental supervision, according to the provisions contained in the *bandi* (decrees) regulating manufacture, accuracy, sale and price.[2]

The weights were sold loose, i.e. without boxes, throughout the 17th and most of the 18th centuries. Only in the second half of the 18th century did the first wooden boxes appear especially arranged for the storage of scales and weights. They are rectangular, with one or two drawers containing a place for the scales, which have an iron beam and brass pans, and compartments for the weights, sometimes a separate one for gold-coin weights, and one for silver-coin weights. See Figs. 1 and 2.

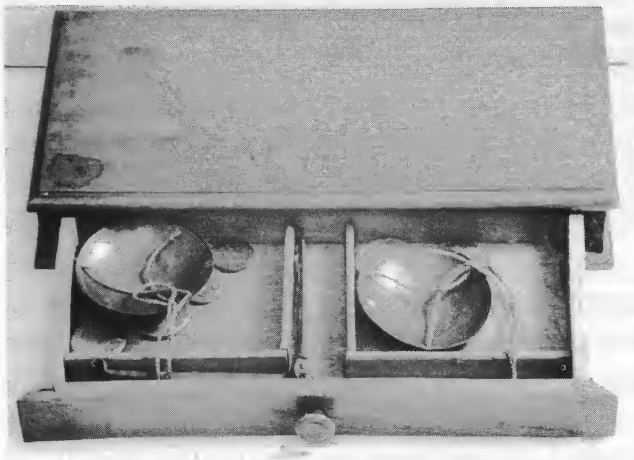


Fig. 1. ⩓ Late 18th century box with a drawer. Beam with swan-neck ends, isolated between two weight and pan pens. Although the contents are of suitable size to be carried in the pocket, this set was made to sit on a desk.

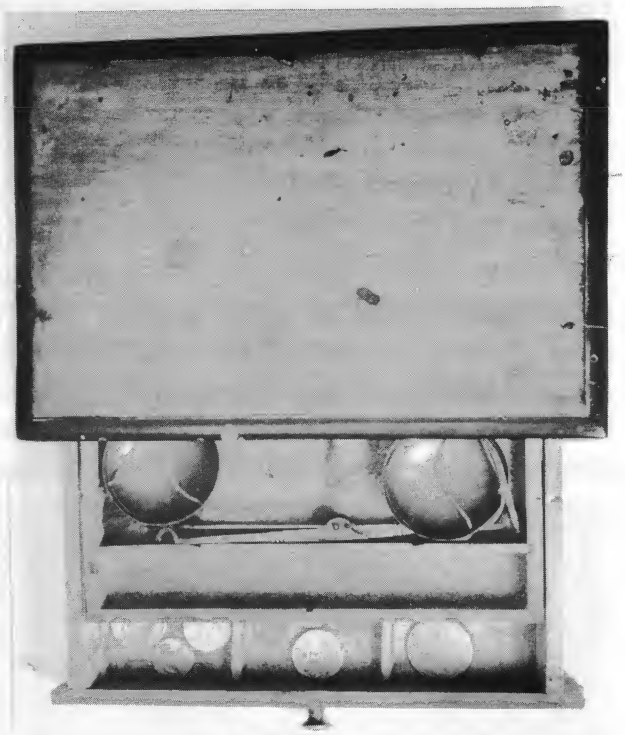


Fig. 2. ⩥ Late 18th century box with a tray inside the drawer. The tray acted as a guard to prevent the loss of the weights. Beam with swan-neck ends. Because the Italian States were independent and minted their own coins, any money-changer needed a huge array of coin-weights.

In the second half of the 18th century the introduction of new minting machines allowed the issue of better coins, with special attention paid to the uniformity of weight. These new coins required, in turn, more accurate coin weights and probably the importance of preservation without wear was increased. As a result, at the end of the century, the first - for Milan - rectangular boxes appeared with circular recesses for individual coins. They had a wooden structure, with the inside lined with chamois leather and the outside covered in leather or decorated paper. This style went on till the 1870s.

We can distinguish three main categories:-

(a) Boxes with rounded corners and covered with black leather, (Figs. 3 and 4). They are slightly older and could date to the beginning of the 19th century. The number of recesses varies between 8 and 20.

Fig. 3. ⩓⩓ Italian coin-scales with soft padded chamois-leather lining. The lining preserves the weights in superb condition. 13 recesses.

Fig. 4. ⩓⩓ Coin-scale with typical chamois-leather lining and beam with double-hole ends. The pans have the characteristic flat, outwardly angled rims. 19 recesses.

(b) Boxes with straight sides covered with lighter leather (brown, black or green) or with paper variously tooled. They can be dated from the 1820s up to about 1860. The number of recesses varies between 8 (the most common) to 10 or 13 (figs. 5, 6 and 12). Since these boxes are the most frequently found, a brief description of the contents is given, which could apply also to the boxes in category **a**.

The weights vary in number from about 20 - in the case of the boxes with 8 recesses - to more than 40. [Ed- smaller weights are stored under the larger weights in the same recess.] The weights reflect the economic horizon [trading partners] of Lombardy in the 19th century, being Savoy, Genoa, Venice, Lombardo Veneto, Parma, Rome, Spain, France and the Austrian Empire. Weights for coins of the Napoleonic era are present in some boxes. A few boxes contain round weights of 1 to 6 or 8 deniers [units used to weigh any coin, being Italian pennyweights]. Bigger boxes may also contain weights for

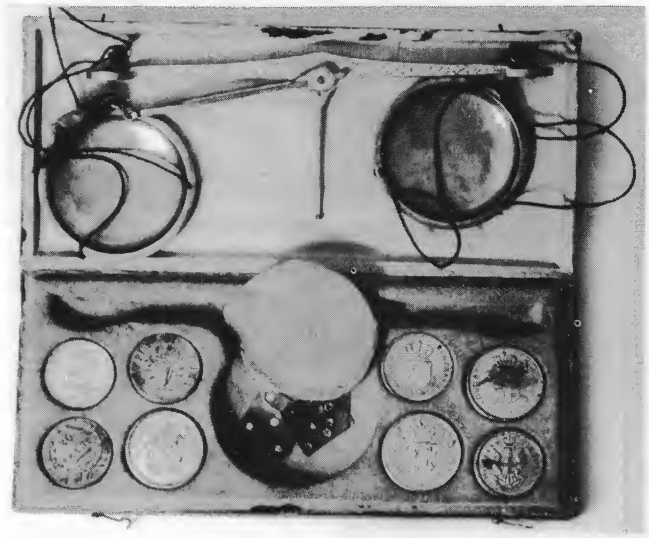
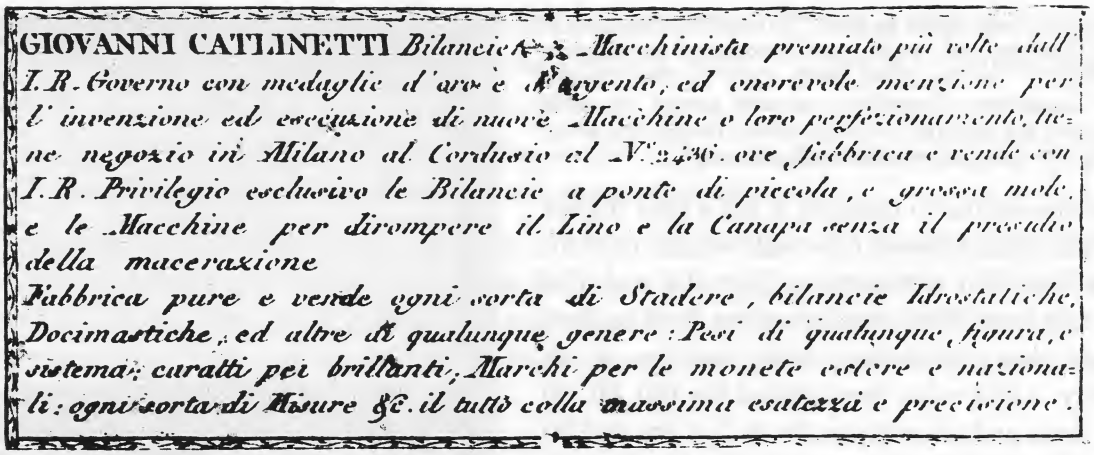


Fig. 5. ⩓⩓ Beam decorated with flowing curlicues. Chamois lining in base but cream fabric lining in the lid. Flap under the pan moved to show the grain weights.

Fig. 6. ➢➢ Scales by Gio Catlinetti of Cordusio no. 2436, Milano. 11 recesses. Trade card on next page.


GIOVANNI CATLINETTI *Bilancie* ... *Macchinista premiato più volte dall' I.R. Governo con medaglie d'oro e d'argento, ed onorevole menzione per l' invenzione ed esecuzione di nuove Macchine e loro perfezionamento, tiene negozio in Milano al Cordusio al N.° 2436. ove fabbrica e vende con I.R. Privilegio esclusivo le Bilancie a ponte di piccola, e grossa mole, e le Macchine per dirompere il Lino e la Canapa senza il previo della macerazione*

Fabbrica pure e vende ogni sorta di Stadere, bilancie Idrostatiche, Docimastiche, ed altre di qualunque genere: Pesi di qualunque figura, e sistema; caratti pei brillanti, Marchi per le monete estere e nazionali: ogni sorta di Misure &c. il tutto colla massima esattezza e precisione.

GIOVANNI CATLINETTI, *scale maker and builder of machines, awarded by the Imperial and Royal Government many gold and silver medals and honourable mentions for the invention and construction of new machines and improvements to machines. He has a shop in Milan at Cordusio 2436, where he makes and sells under I.R. privilege, small and large platform scales, as well as machines for flax and hemp without need for soaking.*

He also makes and sells all sorts of steelyards, hydrostatic balances, scientific scales and others of any kind; weights of all kinds and descriptions, carats for diamonds, coin weights for national and foreign coins, all sorts of measures etc., everything made with the utmost accuracy and precision.

Fig. 7. AA Tradecard of Giovanni Catlinetti. The Imperial and Royal Government was that of Austria.

coins of Florence, Naples and Portugal. Weights for the British guinea also exist, but they are very rare since, apparently, this coin did not circulate extensively in Lombardy. All the above are weights for gold coins; weights for the silver French coins, for the Thaler or for the silver Ecu, are found only in big boxes. All boxes contain (or should contain) fractional weights from 1 to 6 grains, which are normally found in the recess for the scale pans, under a chamois-leather flap, (fig. 5).

The scales are made of brass, the beam is flattened with the ends slightly raised or pointed, and pierced with two holes through which go the S hooks of the cords. (Figs. 9 and 10.) The pans are brass, suspended by three silk cords.

A few maker's names of the category (b) boxes are known:- Giovanni Catlinetti, a manufacturer active in the years 1807-1822; Bartolomeo Greppi, who took over Catlinetti's workshop; and Antonio Albertoni. They used to affix their label on the inner side of the lid (where a few survive) and, at least, Catlinetti and Greppi stamped their name on the reverse of the weights they produced. (Figs. 8 and 11.)

Fig. 8. FABRICA. CATLINETTI IN MILANO

Fig. 9. Double-hole end

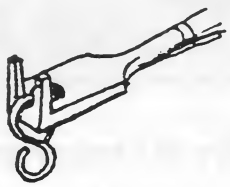


Fig. 10. Horned double-hole end

Fig. 11. FABRICA GREPPI IN MILANO

Fig. 12. ➢➢ Coin scales by BART^{MEO} GREPPI, Bilanciere in Milano, Cordusio, N^{O} 2436, qual Successore del Negozio CATLINETTI. As the labels rarely stuck to the chamois-leather, Bartolomeo Greppi very sensibly printed his name directly onto the chamois. Note the horned double-hole ends, as in Fig. 10. [Negozio means shop/workshop.]

(c) Boxes similar to category **b** but a little thicker and with slightly domed lids, with weights only for Italian liras and centesimi. (Figs. 14 and 15.) They date from 1861 onwards when the Kingdom of Italy was established, with the lira as its currency. Gold coins were minted for 100, 50, 10 and 5 liras, and silver coins for 5, 2, 1 lira and 50 and 20 centisimi. The full set of weights is normally present, although, in some transitional boxes, the weights for the 100 and 50 liras are replaced by weights for the older Piemontese issues of 80 and 40 liras. The scales are sometimes similar to the ones of catagory **b** but sometimes thicker.

Conclusions

A good complete set is always rare and a lot of attention must be paid in order to perceive possible additions. The round form of the recesses together with the chamois-leather lining allows some manipulation; of course it must be borne in mind that some additions could have been contemporary since it was practical to substitute weights for coins no longer in use with weights for newly-issued coins.

Fig. 13. ⩓⩓ Box made after 1861, lined with chamois.

Fig. 14. ⩓⩓ Box made after 1861, for gold and silver coins, with cloth lining in the lid.

Boxes of type **c** are scarce; this can be explained by considering that, at that time, the progress in minting was such that the weighing of money was no longer needed. (Detection of counterfeits was another matter, but, for this, rockers were of more use.)

For types **a** and **b** boxes, the rarity depends on the number of recesses, the ones with 8 recesses being common, those with ten being scarce, and those with more being rare.

On the other hand, it is difficult to assess the rarity of 18th-century boxes with drawers, since they were probably custom-made and not mass-produced as they were in the following century. What is more, it is impossible to know whether the contents are original; at best, you can check that the weights are of the same age and that they were made by the same producer, either by finding matching countermarks, or by stylistic similarities.

Notes and References

1 Mazza, F, *I Pesi Monetari di Monete Milanesi*, published by the Comune di Milano, 1982. Illustrations of five early documents, three maker's trade cards, 52 maker's marks (22 of known makers), 100 verification marks and 370 coin weights.

Borzone, P, *I Pesi Monetari di Monete Italiane*, published by the Comune di Milano, 1988.

Borzone, P, *I Pesi Monetari di Monete Non Italiane*, published by the Comune di Milano, 1988. 554 coin weights and 6 coin scales. Mainly weights made in Italy for current coins from other countries, plus some apothecary weights, pennyweights and grain weights.

2 Mazza, op cit., deals thoroughly with supervision.

All photographs by the author's nephew, Michele Gusmeroli.

Italian Trade Weights

The complications of the subtle (and not so subtle) variations between the libbras (pounds) of the various States were compounded by the use of the libbra grossa and the libbra sottile. These were roughly the equivalent of Avoirdupois pounds and Troy pounds. But the big commercial towns and ports used, in addition, "extra large libbra" containing 28 oncie instead of 12 oncie, in the late 18th and 19th century.

Some striking bronze weights, used in Venice, weighing about 500 and 250 grams, came onto the market recently. They cannot be identified accurately, but the similar ones, in the Musée National des Techniques in Paris, were given to the museum in 1845, and comprise a set of Standards for the State of Lombardo-Veneto. Their ring-shaped 'libbra grossa' included the Venice libbra (478g), half-libbra and two ½oz; the Trévise libbra (517g) and its half; the Verona half-libbra (249g), and the Padua half-libbra (245g).

Review

La Bona Opinione, by D Dameri, A Lodovisi & G Luppi, soft bound, 292 pp, 120 colour photographs (mainly of objects), 92 b & w photographs (most of tables, lists & important illustrations from historic books & documents), published 1997 by the Museo della Bilancia, Via Garibaldi 34a, Campogalliano, Modena, Italy with the co-operation of the State Archive, the Historical Archive of the Commune and of the Modena Estense Library, ISBN 88-86143-08-7, L.60,000 + postage. Available from the Museo.

This is an artistic history of the Estense States (being the States pertaining to the Modena Duchy) from 1598 to 1860, giving the history of measurement, written entirely in Italian.

The title *La Bona Opinione* refers to the mediaeval name of the Controlling Office in Modena, as well as to the name given to a local exhibition organized two years ago to celebrate the grand opening of the new Museum of Balances in Campogalliano, established to promote cultural ties and studies of the sciences and measures used in the Estense States. The work of the Bona Opinione Office dates back to the 13th century. Six books of Statutes approved in 1327 dealt with officially-controlled, semi-annual practices and fiscal requirements. It seems that the Statutes referred mainly to the sketches sculpted at the foot of the *Bonissima* statue and on the steps of the Commune Palace of 1336.

Included in this compendium of the Museum's documentary material are metrological scientific instruments supported by pertinent archival evidence, such as a list of *Bona Opinione* sub-offices in the Duchy, technical engravings, Government decrees, official notifications, correspondence, drawings, etc., corroborating the evolution of thought, in the Ducal Dominions, in searching for a method of standardization of measurement. A list of manuscripts is given at the end of the book. Colourful plates accompany the text. The majority of the items were inherited from Modena University, particularly from the Department of Physics.

The book presents an inventory of single objects up to page 174, cataloguing each instrument with a colour photograph, an estimate of age and an individual bibliography. The collector finds a multitude of fascinating rarities, admirable for their state of preservation, completeness and craftsmanship.

Many excellent illustrations are of metal or wooden measures for liquids or solids, i.e. volumetric measures for wine, oil or wheat. Most of the illustrations of rules are virtually unusable due to poor lighting, but show linear measures for barrels, textiles, land and buildings, with two drawings by Annibale Carracci (see EQM 1774), of artisans with rules.

Weight collectors will appreciate the exceedingly rare set of nesting weights bearing the titles of the Duke of Borso d'Este with the arms of the City of Modena. This set was calculated to be based on a

Fig. 1. Three weights from a fitted box that contains these three and their 15 subdivisions, with grain weights of sheet brass and a poker. Weights estimated thickness 5 mm. Late 18th century.
Museo della Bilancia Acquisition no. III 106

Modenese ounce unit with a base of eight (instead of twelve) for 1 marc. It can be dated to the period 1452-1471, on the grounds that the title "Duke of Ferrara" is missing.

There is a superb Italian set of flat lozenge-shaped ounce weights, late 18th century for the Paris ounce, the Bologna ounce, the Modena ounce and their subdivisions. (Fig. 1.) The set of Nürnberg weights in a round wooden container, of 1781, is in astounding pristine condition. An early interest in metric weighing is shown by a set of Standard weights for Libbra marked in metric 'pounds', made between 1805-1814, although Modena did not go metric until 1861. A set of scientific weights with large hooks [for philosophical demonstrations?] was made in 1792, as was a beautiful set of domed Standard weights for the Modena libbra and the Bologna libbra (Fig. 2).

Fig. 2. From a fitted box containing a 25 libbra & a 1 libbra of Bologna, and a 25 and a 1 libbra of Modena, dated 1792. Lightly engraved with unit and arms of Modena. MAMM, inv. 24

Quite remarkable are the models of proposed designs for die-punches to verify in 1824, 1828, 1853 and 1858. Corresponding samples of the punch-marks are impressed in metal bars.

Scale collectors will enjoy the precision balance of Arleri with its unusually early use of an open lattice beam, 1781-1788, derived from the design of J H Magellan, and a broad central pillar doubling as arrestment gear with a pedal under the base board. In 1780 Agostino Arleri, a Piedmontese Capuchin friar in charge of maintenance of instruments in the Physics Theatre of the University, made this balance for Abbot G B Venturini, professor of experimental physics. The instrument became the pride of the university. The book shows it complete, in detail and dismantled on top of its tripod table. Arleri's associates, Vandelli, Scarbi, Bertacchi and Zoboli, were famous scientific instrument makers who occasionally made analytical scales.

There are excellent photographs of the elegant hydrostatical balance of Gio Culot of Milan, 1811, (Fig.3) with glorious arrestment gear, Gio Culot being "capo-bilanciaio", head supervisor of precision balance makers in Milan. The precision balance of 1850 made by Deleuil of Paris is praised for being the first one with a cast-iron base, instead of wood, to prevent deformation with time and humidity. Its sensitivity was so fine that the balance pan moved when a hand approached it without touching it, due to the ascending current created by the hand's heat! For this scale, Deleuil made a highly accurate Standard Kilo weight which the book shows with pictures and descriptions of both the interior and exterior of its box.

A unique and beautiful money-changers' cabinet of 1750-1775 was made for the Duke with 60 coin-weights in two drawers; unfortunately it now has a 19th century scale. Various components are prominently illustrated, including views of three fine coin-weights stamped with the arms of Ercole III, ruler from 1780 to 1796. The weights of this set are those of the usual Italian States plus the foreign Spanish, Portuguese and French weights, but the three specifically shown are unique (not reported by Dieudonné in his *Manual des Poids Monétaires* or by the main money-weight literature). Since the scale was made specifically for the Duke, it is possible that it was kept for the exclusive use of the City Magistrate.

The inventory of catalogued items is followed by a series of academic technical articles all written in Italian, presented by various authors. They are:-

Hocquet, J C, *Practical Weighing & Measuring*. Measurements for various goods traded in markets in Modena from 13th-19th c.

Grossi, L, *Estense Duke-dom Weights & Measures in the Modena Civic Museum of Mediaeval and Modern Art*. Narrates the history of the collection started 1872.

Barbolini, A R V, *Tracing the Sciences: Documentary Sources and Estense Manuscripts for the History of Astronomy and Mathematics*. Leading Modenese scientists and librarians of 17th-19th c.

Corradini, E, & Trenti, G, *The Instruments of Physics at Modena University, 1700-1800*. An index of related manuscript documents such as letters, bills, receipts etc., transcribed into modern Italian.

Boccolari, G, *The Measurement of Time and the Introduction of the 'European' hour in the Estense Dukedom*. A philosophical history of the origins of time-keeping.

Fig. 3. Detail of the hydrostatic balance, by Gio. Culot, (balance maker) of the Royal Mint, 1811. The balance is built on a small table which stands on a workbench, putting the arrestment gear within reach and the pans near eye-level. MUSMO, inv. 428

Federzoni, L, *Measurement & Symbols in Estense Cartography*. Relates old maps to advancements in instrumentation.

Dameri, D, *Bibliographic Appendix*. Discussion on the lack of uniformity between weights and local measures in 1845 and 1861 when the metric system became legal, to overcome problems of comparing old with new measures.

Some illustrations have no captions, but are within a text separated by dividing lines, so can be readily identified. Occasionally a partial detail appears elsewhere (up to 100 pages apart!) when treated by another author. Each of the 80 catalogued items of the Campogalliano collection is accompanied by its pertinent bibliography and extensive footnotes, providing enhanced educational value to the metrological description and its general historic appreciation. The book lacks an Index, unfortunately, making it difficult to find specific facts or items. The 'index' on the last page is only a list of articles with their author's names.

A CD-ROM for computer Pentium 90 or higher, Windows 95, comes with the book. It guides the visitor (in Italian) through the Museum, helps him in selecting the rooms to visit, gives a musical background (Boccherini's Minuet), extra details and an old States map by which one can evaluate the wide variety of weights and measures used locally during the first half of the 19th century.

Unquestionably readers and collectors will enjoy having this colourful reference book in their library.

L MARSON

ISASC

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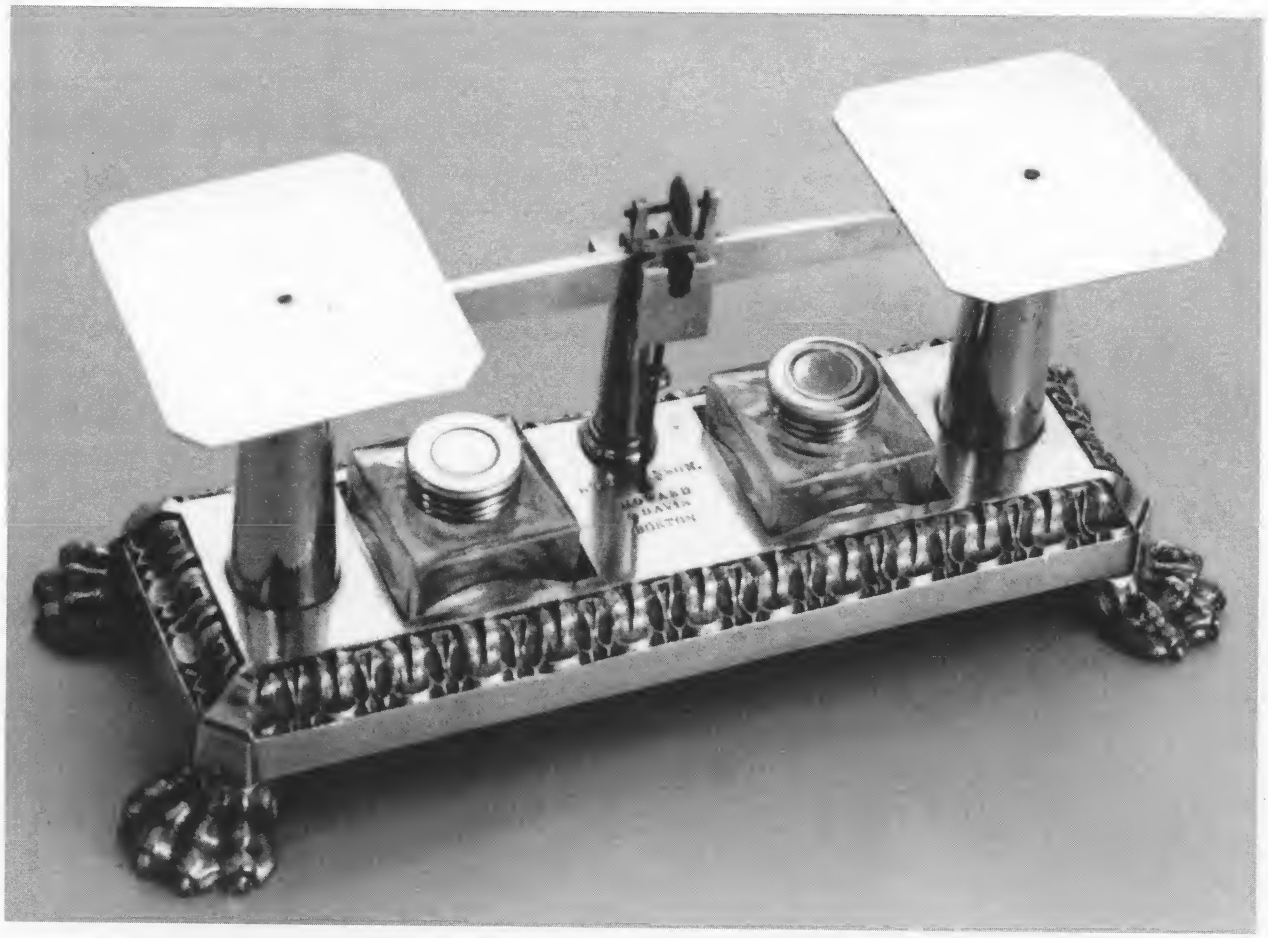

Cover Picture

This ornate postal scale, fashioned of solid brass with lion's paw feet, measures 10 x $4^{1}/_{8}$ins. There are two pressed-glass inkwells with brass tops which screw on lipped brass threaded rings. The pair of inkwells were necessary in offices where they kept accounts using black ink for sums in credit and red ink for sums in debit, but postal scales with two inkwells were much used in private homes also.

The base is inscribed STEPHENSON, HOWARD & DAVIS BOSTON. Being made for the private or office user, extreme accuracy was not a requirement, but Stephenson, Howard & Davis incorporated two features that *would* be necessary on their precise bullion balances, a screw moving along a bar mounted across above the pointer, used to adjust very slightly the centre of gravity of the beam, and, additionally, a gravity ball halfway down the pointer!

The large pillar below each pan conceals the mass used for the stabilising of that pan. The sub-structure is shown in Fig. 6, page 2370. If those masses had not been used, a roberval linkage would have been necessary to keep the pans horizontal. (For comments on Schickert's Principle see Crawforth's *Handbook of Old Weighing Instruments*, Fig. 41, p. 75.) Several American makers considered the use of Schickert's principle, including T Fairbanks in 1859 for a postal steelyard (EQM, p 78 and 427), Maranville in 1878 for a coin scale (EQM, p 2060), White Mfg. Co. in the 20th century for an egg scale (EQM, p 1973), and Petaluma Incubator Co. for another egg scale (EQM, p 1276).

Stephenson was only involved with the company between 1843 and 1847, giving a very short period during which this scale could have been made. B WRIGHT COLLECTION

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Howard & Davis

By B R WRIGHT

Edward Howard was a man of many precisely-made parts - clock-parts, watch-parts, scale-parts, locomotive-parts, fire-engine-parts, bicycle-parts and even plough-parts. Any manufactured object requiring a high degrees of exactness attracted his interest, and most were greatly improved by his mastery and inventiveness.

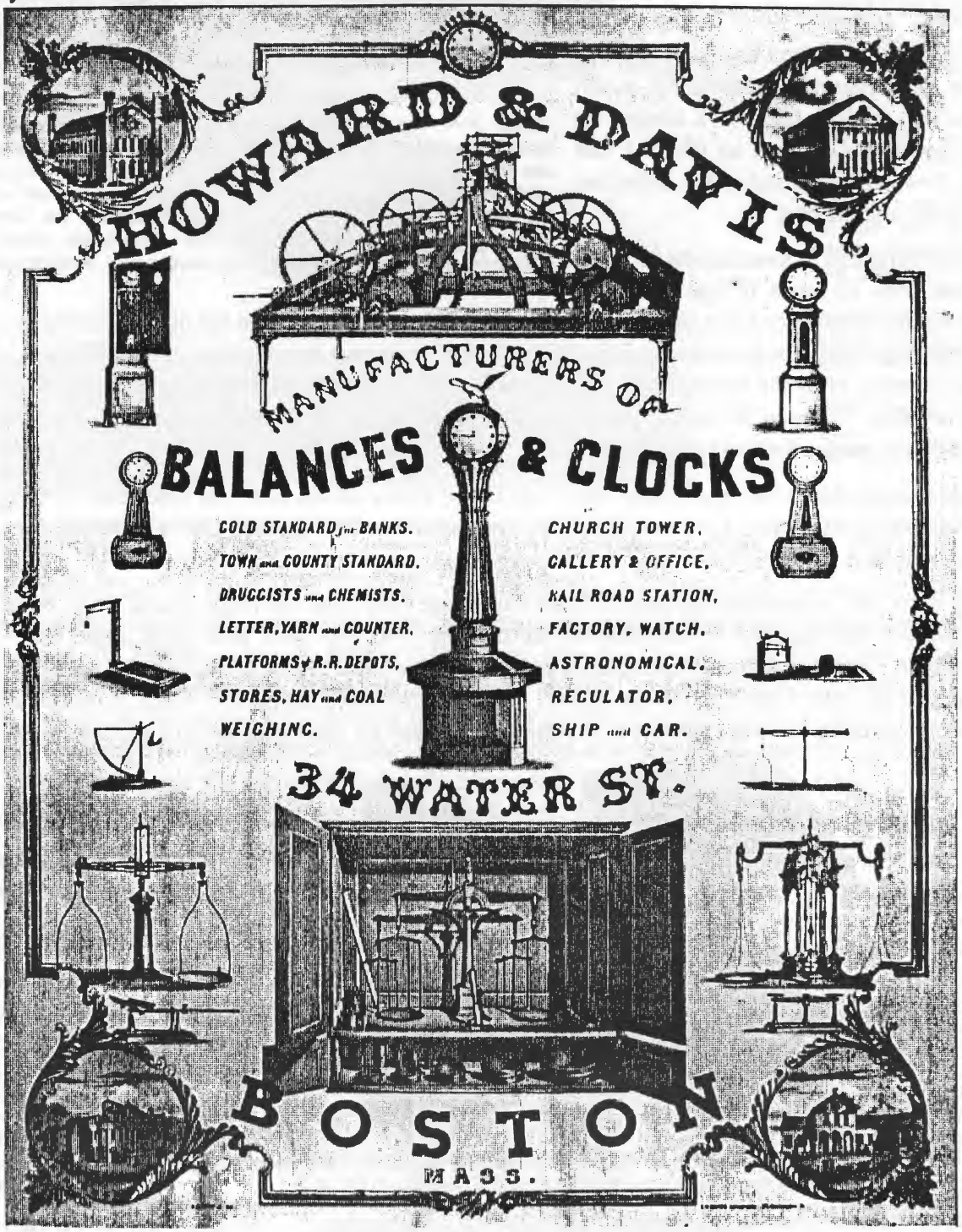

Fig. 1. AA Broadside showing the selection of scales and clocks offered by Howard & Davis c1852.

Reprinted from the NAWCC Bulletin, October 1944

Some of America's most handsome and most precise scales bear his name, as does a system of weights and measures that became standard throughout America. With Aaron L Dennison, he is credited with establishing the watch-making industry in America.

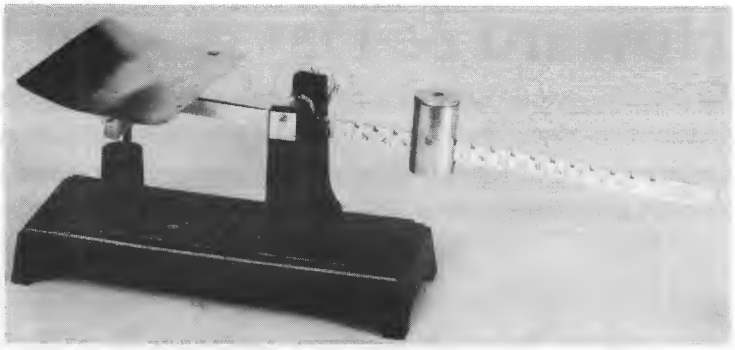

Fig. 2. ⩓⩓ The first official U. S. Post Office scale. The cast iron base, 8¼ x 3 ins, is embossed U.S. P.O. The beam, pan, and poise are brass. The beam is firmly supported by a knife through the steelyard and bearing on the pillars, Graduations on the both sides of the beam are from ½ to 9oz by ½oz. Both sides of the beam are marked HOWARD & DAVIS BOSTON. The poise moves over square-cut grooves approximately $^{3}/_{32}$ in deep. B Wright Collection

The fact that he is best known today as a maker of clocks and watches is due in part to the fact that his later work centred on time-pieces and in part to the fact that there are more clock and watch collectors than scale aficionados.

Born in Hingham Massachusetts in 1813, he was only 12 years of age when the death of his father forced him into the labour market. He went to work for his uncle, Charles Howard, a wheelwright and plough-maker and one of the first to make cast-iron ploughs. At 14 Edward left his uncle's employ to try the fishing trade. He returned to metal-work at 16, becoming an apprentice in the Roxbury shop of Aaron Willard Jr, youngest of the four famous clock-making brothers. He served as Willard's apprentice for five years.

Another apprentice in Willard's small shop was David Porter Davis, one year older than Howard and also Massachusetts born. The two formed a friendship that would develop into a partnership and last throughout their lives.

Clock-parts, like all mechanical parts in those days, were filed from the rough by hand and assembled in a process that can best be described as *cut and try*. No two parts were alike; none were inter-changeable. The young men worked together on a plan to make certain clock-parts by machine. The immediate success of this effort is not known. What is known is that in 1850, when Howard ventured into watch making, he was a pioneer in inventing machinery for producing perfect and interchangeable parts.

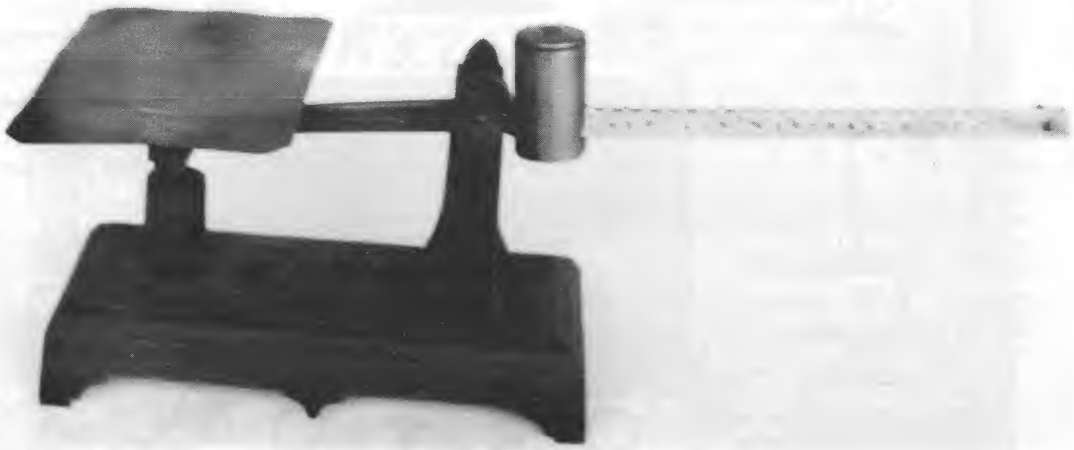

Fig. 3a. ⩓⩓ This official post office scale by E Howard & Co. is nearly identical to the 1855 models. It is graduated from ¼ to 6oz by ¼oz. The base is embossed U.S. P.O. W Doniger Collection

Fig. 3b. ➢➢ Detail of beam showing manufacture by E. HOWARD & CO. which indicates manufacture between 1857 and 1875. Beam triangular in section, so the poise runs along a sharp edge, & graduations are easily read.

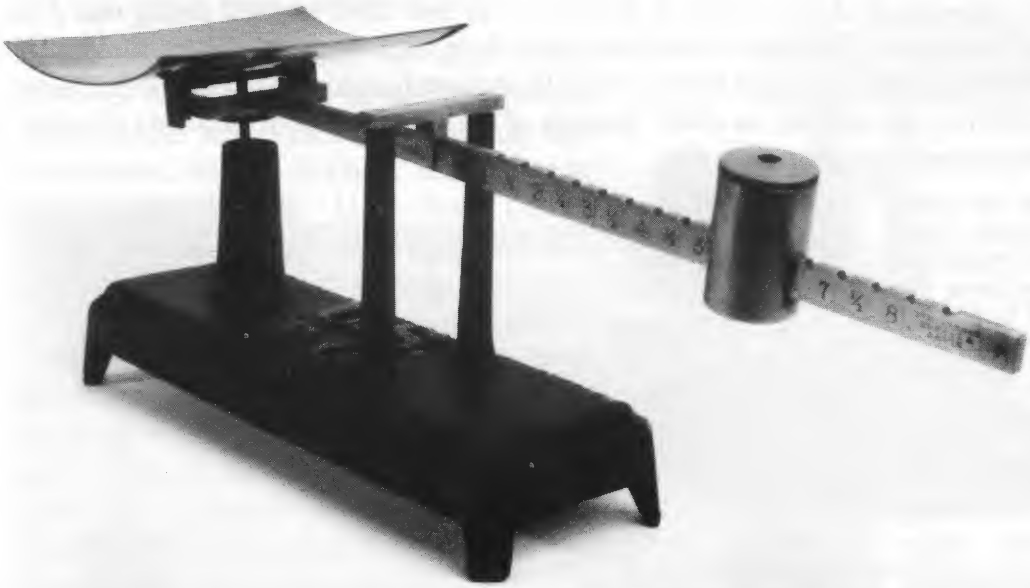

Fig. 4a. ≺≺ Scale used by the post office prior to 1855, as indicated by the embossed U.S. P.O. on the base and the inscription STEPHENSON, HOWARD, & DAVIS denoting manufacture before 1847. This resembles the 1855 scale except that the base is $^{2}/_{16}$ inch longer, $^{1}/_{16}$ inch narrower, and less sturdy. The beam is held by a bar affixed to the top of the steelyard and held on the pillars by pivots. The pivots rest in holes drilled in the pillars, making them easy to displace. The poise moves over grooves $^{1}/_{16}$ ins deep.
L Press Collection

Fig. 4b. ≺≺ The maker's name is imprinted at the end of the beam, with PATENTED BOSTON on the obverse. L. Press Collection

Edward Howard had his first known encounter with scale-making in 1834 when he went to work for Henry Plympton, who was the successor to the business established by Benjamin Dearborn and whose shop was at 10 Theatre Alley in Boston. Dearborn was the inventor and for many years the manufacturer of *Dearborn's Patent Balance*, a steelyard patented in 1790 for precision weighing,[1] as well as a maker of handsome gold standard balances for precision weighing (see EQM 1211-1216).[2] During his six years with Plympton, young Howard worked mostly on bank balances, perfecting, no doubt, the designing and fabricating skills for which he would earn great acclaim. See page 2376.

By 1840 his reputation as an inventor and designer won the 27 year old Howard the appointment as Deputy Sealer of Weights, Measures, and Balances for the State of Massachusetts. He was to hold this position for many years.

Also in 1840 Howard left Plympton and embarked on a business of his own. He obtained premises in Boston at 15 Hawley Street where he was joined by David P Davis. This probably was not yet a partnership. Both the 1842 and 1843 Boston city directories list them separately but at the same address. Both are listed as *clock makers.* By

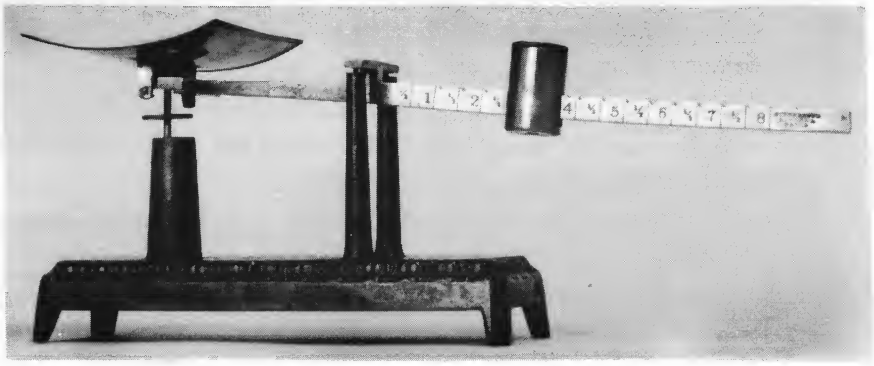

Fig. 5 ≻≻ Stephenson, Howard & Davis scale like the one shown in Fig. 4a & 4b except that there are no post office markings on the base.
B. Wright Collection

1848 the listing was *Howard & Davis, Clocks & Balances*, and their 1849 to 1852 listing was *Fire engines, clocks and balances*. The latter directories gave their address as 34 Water Street. In reminiscences published in 1868 as part of a history of clock- and watch-making, Howard wrote, *I went into business for myself as a clock maker in 1840.* Records of the birth in 1845 of Howard's daughter, Lucy, list her father as *balance maker*.

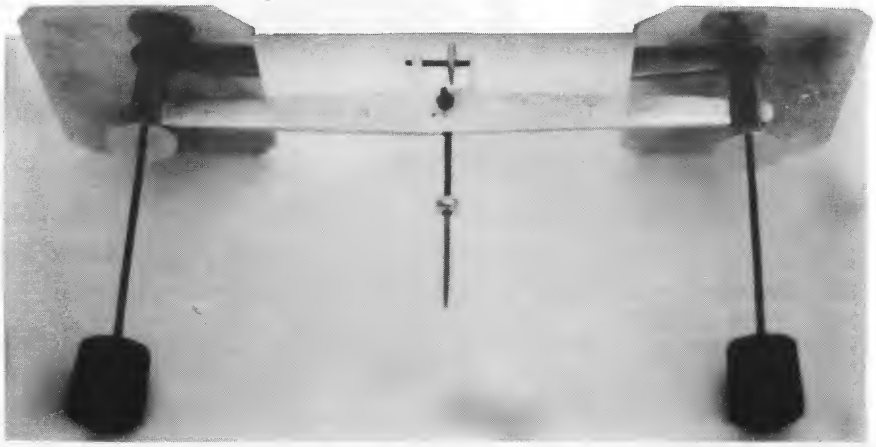

Fig. 6. ➢➢ Detail of the Cover picture, a particularly ornate postal scale, made by STEPHENSON, HOWARD & DAVIS, showing the stabilisation of the pans by hanging a mass on the ends of rods screwed to the under-side of the pans, [Schickert's Principle].
B Wright Collection

Whatever his professional designation, there is strong evidence that the main products of the partnership's earlier years were balances. Luther S Stephenson, a brother-in-law of Howard's former employer, Henry Plympton, joined the pair in 1843 or 1844 and the trio took over Plympton's old Boston shop in Theatre Alley, operating under the name Stephenson, Howard & Davis. They also retained the Hawley shop and added a showroom at 42 Congress Street, which was later moved to 72 Water Street.

By 1845 they had built a factory in Roxbury, Massachusetts. They made a general line of scales as well as gold standard balances and the Dearborn Patent Balance. In addition, they made church and gallery clocks, regulators, and *Willard Timepieces*. Stephenson withdrew from the business in 1847. Operating under the name L Stephenson & Co, he retained the 72 Water Street premises while Howard & Davis established new quarters at 34 Water Street.

Prepayment of postage was made mandatory in America by an 1855 Act of Congress. Prior to that, postage was based on the number of sheets in the letter and the distance it was to travel. Howard & Davis were one of a hundred or so inventors who responded to the Postmaster's call for bids to make 40,000 postal scales. Along with a price quote, respondents were required to submit working models.

Howard personally carried five different models to Washington. The contract was awarded to him for his simple, unadorned half-roberval steelyard with U.S. P.O. embossed on the base. Unfortunately, no records exist of the many models submitted for this competition. A call to the Post Office Museum in Washington, D.C. elicited the information that the museum had a Howard & Davis scale but did not know it was the first official U.S. Post Office scale. The Post Office itself had no knowledge of the call

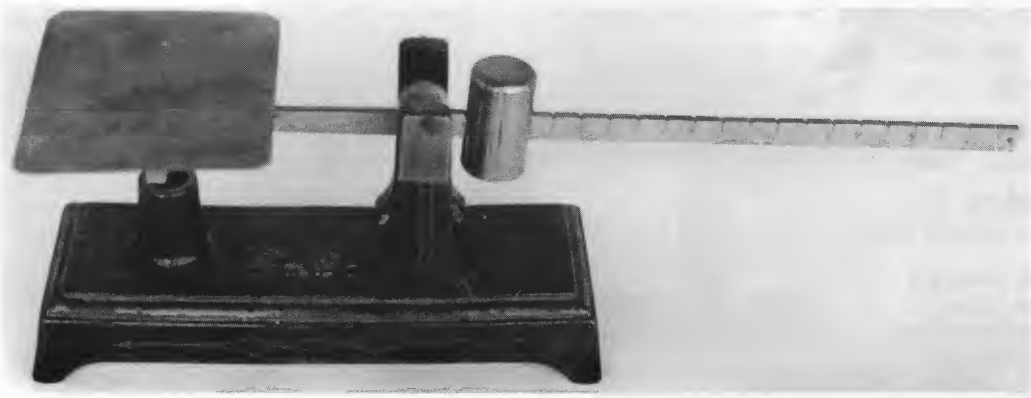

Fig. 7. ≺≺ A postal steelyard, capacity 9½oz. The cast-iron base, marked P.O., retains its original striping. The pan has FAIRBANKS NEW YORK on it, indicating manufacture in 1875 or later. The brass dust caps are large.
W Doniger Collection

for bids and no records of the results.

While the winning scale of 1855 clearly deserves its designation as the first official U.S. postal scale, there is evidence that Stephenson, Howard & Davis' scales were in earlier use in the U.S. Post Office. Prepayment of postage by weight had previously been possible in America and many postmasters had developed their own indicia of whether the letter was prepaid or not. Even after the issuance of the first American adhesive postal stamp in 1847, mail could be sent either prepaid or collect. The cost was 3 cents for ½oz prepaid and 5 cents for ½oz if the postage was collected from the recipient.

Fig. 8 ^A^ An unusual postal bismar scale made by J W Strange, a blacksmith who made small instruments such as protractors in Bangor, ME. It is believed to date from about 1874. The base, the pillars and the poise are handsomely enamelled in red. It is small, the base being only 4 x 2¼ins, (100 x 54mm) & the scale only 4 ins high. Capacity 10oz by ½oz. W. Doniger Collection

There is evidence, too, that the need for postal scales in homes and businesses was anticipated as soon as an adhesive postal stamp was issued. While no attempt has been made to search for or identity the earliest individual U.S. postal scales, the writer's collection includes two examples, both made during the 1843-1847 period while Luther S Stephenson was a partner in the firm.

Fig. 9. ^A^ The set made for Sturbridge Town by Howard & Davis in 1847 is housed in a wooden cabinet with four lockable doors, indicating the value placed on this set, and the recognition of the need to keep the set free of dust. It measures 6½feet wide, 2 feet deep and 7 feet tall. Old Sturbridge Village, photo by Thomas Neill

The English maker R W Winfield of Birmingham registered the design of a postal candlestick in 1840, the year the famous English Penny Black adhesive postal stamp was issued. (See EQM p 11.) He also produced candlesticks indicating rates for both *Prepaid* and *Not Paid* U.S. Postage.

Howard & Davis continued to manufacture the postal scales for the United States Post Office until 1875, when the contract went to Fairbanks. It is not known whether they were outbid by Fairbanks or whether, as seems likely, the firm withdrew to concentrate on the manufacture of other products which by this time included locomotive-parts and watches.

William Doniger's collection includes two early postal scales, an official Fairbanks Post Office scale and an unusual bismar for personal use, fig. 8. Perhaps other ISASC members have postal scales of the same period. It would be interesting to compile an inventory.

Almost concurrently with the awarding of the postal scale contract, another Howard & Davis product also won a large contract from the U.S. Government. Intended to meet the needs of the Massachusetts

Weights, Measures and Balances Department, and conform to standards set by the Federal Government, Howard designed a set of Standard weights, measures and balances.

The Massachusetts Legislature accepted Howard's submission as the standard for the state and ordered 330 units, one for each town, city and country in the state, at a cost of $50,000. The cabinet and its contents also received the approval of the Federal Government. The number ordered in the initial government requisition is not known, but the cost was said to be upwards of $100,000.

By telephoning around the writer found the cabinet (pictured in figures 9, 10 and 11), in the Sturbridge Museum in the Old Sturbridge Village in Sturbridge, Massachusetts. It was used by the town of Sturbridge until the 1930s. The cabinet contains a notation that the content was last examined in 1931. Laws then in existence required testing every 10 years.

While Howard & Davis never manufactured locomotives, the firm did play an important role in the conversion of the American railroads to steam, beginning in the 1860s. At that time America had no factories geared to the manufacture of locomotives and the precision parts they required. Howard & Davis were among the many makers of precision parts which could re-tool and turn out these vitally needed parts without major changes.

Strange as it may seem, there is an affinity between clock-and watch-making and locomotive manufacturing. James Watt, (the inspired engineer who made the steam engine a practical proposition), studied watch-making for two years before setting himself up in Glasgow, Scotland, as a maker and repairer of scientific instruments. George Stephenson, the English designer of the first practical railroad locomotive, worked in his younger years as a watch and clock repairman. In the U. S, the Baltimore & Ohio Railroad offered a $4,000 prize to anyone who could construct a steam locomotive capable of pulling 15 tons at 15 miles per hour. It was won by two Philadelphia watchmakers, Ezekiel Childs and Stacey Costell.

Howard & Davis did manufacture complete fire-engines. Their 1852 advertisement lists fire-engines above, and in much larger type, than clocks and balances. These were not the rushing, hose-covered engines we know today. They were hand- or horse-drawn carriages known as *tubs*. The reservoir or tub was mounted on the body of the carriage and had to be filled by a bucket brigade.

In 1850 Edward Howard teamed up with Aaron Dennison, a watch repairman, to form America's first watch-manufacturing company. Prior to the formation of this partnership, no watches were made in America. The venture had its up and downs. The partners refused to import parts from abroad or to employ foreign labour. Their idea was to systematise watch-making by inventing and building machines for producing interchangeable parts. When, finally, the very costly tooling for the numerous tiny parts a watch required was completed, they found they needed ten times more space than previously, so a new building was required. It was built in Waltham, Mass, and occupied in 1854. The new firm, The Boston Watch Company, went into bankruptcy in 1857, a failure Dennison attributed to Howard's tendency to be diverted by other ideas. While that criticism may well be true, the theory ignores the fact that the company was saddled with heavy start-up debt and losses prior to Howard's arrival on the scene and that a financial panic in 1857 left many without the money to purchase such luxury items as watches.

Howard returned to Roxbury and with his cousin, Albert Howard, formed E Howard & Company. The much sought-after watches continued to be made under Howard's direction until 1882 when he sold the firm. The watches bore the name *Edward Howard* until 1932. It is amusing to note that Howard's venturesome spirit continued to dominate the company even after he left. In 1895 the E Howard Watch and Clock Company went into the manufacture of bicycles, which they hoped to sell through certain

DIRECTIONS FOR USING

THE MASSACHUSETTS

STANDARD BALANCES, WEIGHTS, AND MEASURES.

Raise the Balance, by depressing the lever, and if one scale appears heavier than the other, they are balanced by moving the equipoise, or brass ball in the circular opening, on the top of the beam, upon the horizontal screw, towards the lightest scale, until an equilibrium is produced.

Let the scales down to a state of rest while placing the weights thereon, both the standard weight and the weight to be adjusted: great care should be taken that the weight should be placed near the centre in each scale. Be careful that no weights be put on or taken off while the scales are raised. In raising or lowering the beam, the lever-handle should not be suffered to *slip* from the hand, for a sudden fall will tend to destroy the nice points of suspension, on which the accuracy of the balance essentially depends.

In *sealing* the *Measures*, both liquid and dry, water is preferable; the holes and cracks which in some instances are found in wooden measures, may be first filled with a little hard soap, or grease; the use of seed or grain of any kind should be avoided if possible, its bulk being very changeable. Oil the top of the measures after using. The two pieces of plate-glass are intended for strikes for the measures.

To save the trouble of lifting the dry measures when filled with water, there is an appendage to be attached to the end of the case, where there is a socket for that purpose, called a tripod, or half-circle, with adjusting slides for the suspension of each dry measure when used for sealing, and when thus placed, it is then ready to be filled with water, and is discharged into the measure to be sealed while resting on the tripod.

The *tin tube* is for the purpose of displacing water from the Standard measure, so as to render it convenient for pouring the balance of the contents into the measure to be sealed. The tube is made tapering, so that it may be carefully inserted, and when done, one of the fingers *must* be placed upon the aperture at the side, near the top, while passing it to the measure for sealing.

BOSTON, JULY 1, 1848.

HOWARD & DAVIS, Manufacturers, Boston.

Commonwealth of Massachusetts.

The following is a List of the STANDARDS as furnished to each *Town*, *City*, and *County* in the Commonwealth, agreeably to the Acts and Resolves, passed in 1847 and 1848; and the undersigned are the Commissioners appointed by the authority of the State for supplying said Standard Weights, Measures and Balances.

The Standards embrace the following, viz:—

One Avoirdupois Balance for 50 pounds.

One Set of Avoirdupois Weights of Sixteen Divisions, viz:—
DRACHMS,—1, 2, dr.
OUNCES,—¼, ½, 1, 2, 4, 8, oz.
POUNDS,—1, 2, 4, 5, 10, 20, 25, 50, lbs.

One Set of LIQUID MEASURES, of Six Divisions, viz:—
Gill, Half-Pint, Pint, Quart, Two Quarts, Gallon.

One Set of DRY MEASURES of Five Divisions, viz:—
Quart, Two Quarts, Half-Peck, Peck, Half-Bushel.

One YARD MEASURE.

The foregoing Standards, are accompanied with a CASE or CABINET, in which the Standards are to be kept in a careful state of preservation, all arranged in separate apartments.

BOSTON, JULY 1ST, 1848.

JOS. BARRETT,
HENRY PLYMPTON, COMMISSIONERS.
CHAS. A. WELLS,

Fig 10. ^^ Instructions dated July 1, 1848 are glued inside the cabinet (Fig. 9) naming Howard & Davis of Boston as the manufacturers. The lower portion, defining the standards of the Commonwealth of Massachusetts, is signed by three Commissioners including Henry Plympton, the first scale-maker to employ Edward Howard.
Old Sturbridge Village, photo by Thomas Neill

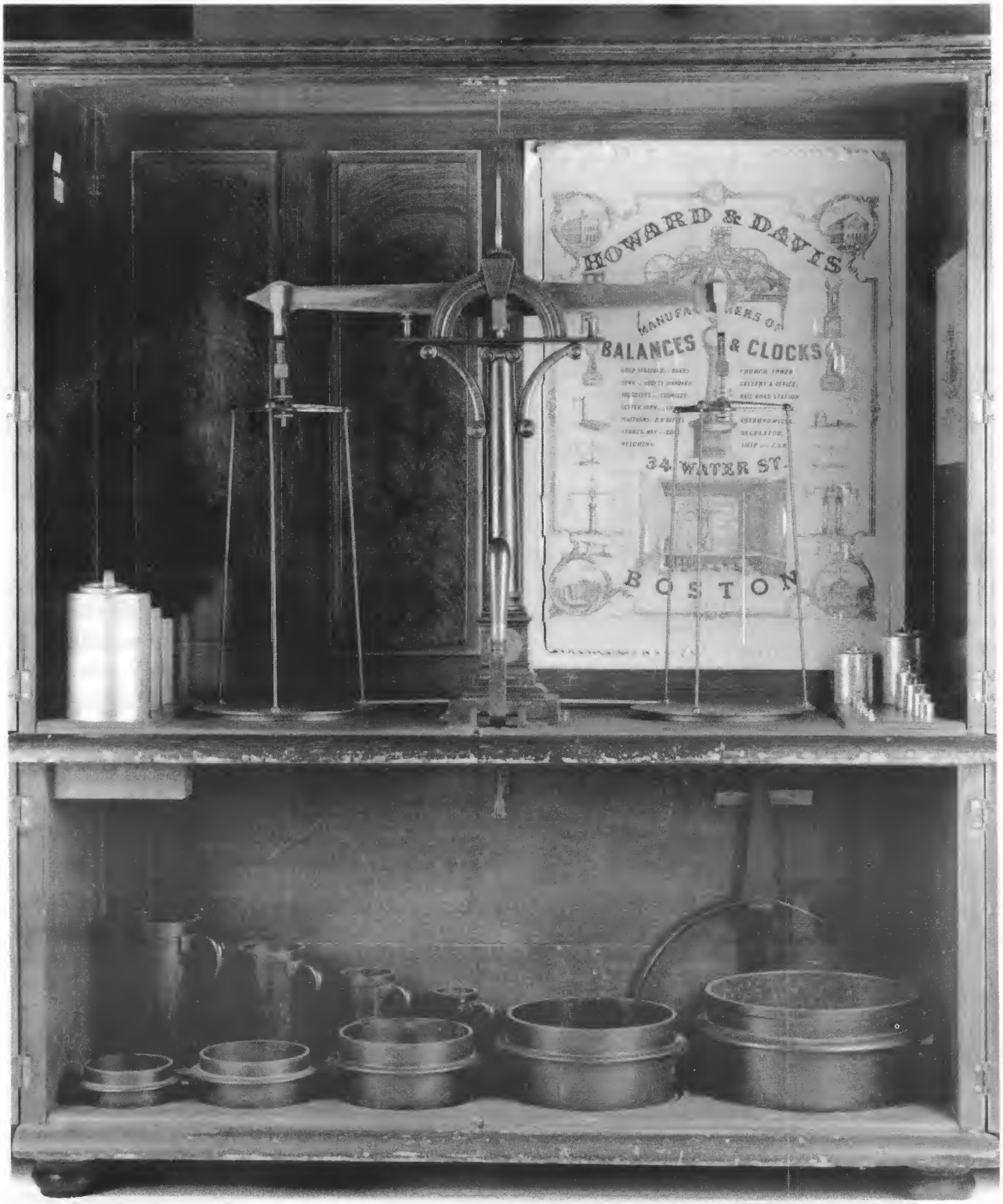

Fig. 11. AA The full complement of Standards for Sturbridge Town. The four-door cabinet contained one balance, capacity 50 pounds avoirdupois; one set of avoirdupois weights of sixteen divisions – 1 and 2 Drachms; ¼, ½, 1, 2, 4, 8 Ounces; 1, 2, 4, 5, 10, 20, 25, 50 Pounds; one set of liquid measures of six capacities – gill, half-pint, pint, quart, two quart, gallon; one set of dry measures of five capacities – quart, two quarts, half-peck, peck, half-bushel; one yard measure. To ease the testing of liquid measures, there is a socket in the side of the cabinet fitted with a half-circle device that held the measures prior to filling. There was also a tin tube for use in pouring liquids into the measures. Note the rims right round the dry measures, adding rigidity and acting as handles. The pillar is the design of that used for their Mint scales, but the beam-ends are different and most unusual. The ring handles of the smaller weights are lying flat. Old Sturbridge Village, photo by Thomas Neill

jewellers. *Every man who carries a Howard watch will want a Howard bicycle* proclaimed their advertisement. Presumably the venture was successful, as the company made bicycles for a number of years.

Edward prided himself on having sold his company for $81,000 in cash. *No notes or promises for me* he was quoted as saying. Unfortunately, he was not as clever with investments as he had been with products. He suffered financial reverses so serious that he was forced to pledge one of his most prized possessions, Watch No. 1 of the Boston Watch Company, and the gold medals his watches had won. The watch was redeemed by members of the Massachusetts Charitable Mechanics Association, which also gave aid to Howard and his family. Edward Howard died in 1903. He is buried in Mt. Auburn Cemetery, Cambridge, Massachusetts.

David P Davis was not directly involved in the Boston Watch Company nor in its successor. Howard seems to have had him in charge of running of Howard & Davis, although the diverse products Dennison had complained about were made by that firm. In addition to the products already mentioned, the partners ventured into making numerous others, including sewing machines, which they began producing shortly after 1843 when Elias Howe, working in a neighbouring shop, won credit for its invention. Their sewing machines were successful technically but not financially. When an 1859 fire destroyed the Worcester, Massachusetts factory, they wrote off a $50,000 loss and did not rebuild.

The 1856-67 Boston Directory lists Howard and Davis as operating at 43 Cornwall. Although no definite information has been found about the dissolution of the company, it is thought that Davis separated from Howard in 1865. He is listed in the 1868 Boston City Directory along with his son, David P Davis, Jr. as a clock-maker.

Collectors could engage in heated discussions on whether the greater of Edward Howard's contributions were his clocks and watches or his scales. It is certain that ISASC members would come down on the side of his scales, especially those handsome and highly-precise balances he made for banks, mints, etc. Many of the balances made for banks still stand in the bank (or its successor) for which they were originally ordered. ISASC members had the privilege of examining the large bullion scale on display in the San Francisco mint when the ISASC convention was held in that city in 1989. (See EQM 1216.) A later EQM article will cover these handsome precision balances more fully.

For the writer, this article has raised an important question: The broadside shown in Fig. 1 advertises a wide variety of scales, yet the only surviving examples of Howard and Davis' work known to any of the people who contributed information to this article are designed to weigh postage, coins, or bullion. Does any reader have Stephenson, Howard & Davis, Howard & Davis, or Edward Howard balances designed for other purposes or have additional information about the men who made them?

Acknowledgements

Thanks for assistance are gratefully given to Steven D Beare, Jerome Katz, Lewis Weiss and the late Ruth Weiss, Frank G. White, Curator of Mechanical Arts, Old Sturbridge Village and to Ruth and Will Willard.

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Small, Dr. P L, notes edited by F. Earl Hackett, *E. Howard -- the Man and the Company,* The National Association of Watch and Clock Collectors, Inc. 1962.

Depew, C M, ed, *1975-1895 One Hundred Years of American Commerce*, New York 1968, Vol II.

Notes and References

1 Editor- *Knight's Mechanical Dictionary* reports '*Dearborn's steelyard (Massachusetts, 1800) has the center of motion, center of gravity, and point of suspension adjustable, so that it vibrates like a scale-beam when unloaded and when loaded in equilibrium.*' Quoted in Barker,H, *Pictorial History of American Scales 1850-1950*, vol I, 6.

2 See Dearborn's advertisement, on page 2376, which has pictures of the scales mentioned.

Old Advert, 1828

Balance for Merchandize.

DEARBORN'S

PATENT BALANCE.

Henry Plympton Sole Successor to the Patentee

Gold Standard Balance for Banks.

BOSTON, JAN. 1, 1828.

Having purchased the entire stock of Balances and Apparatus belonging to BENJAMIN DEARBORN, Esq. *together with his* Patent Right, *with exclusive powers and privileges for manufacturing the same, we beg the pleasure to acquaint you of the change, and our connexion under the firm of*

ALVAN BABCOCK & CO.

Henry Plympton Surv.g Partner.

And also stating that we shall continue the manufacture of Balances and Apparatus, *at the* Original Factory, *in* Theatre Alley, *communicating with* Federal Street, *in all their various branches; and as we retain the principal Workmen, who have been in the employ of the* Inventor, *our* Respected and Venerable Predecessor, *nearly from the commencement of his establishing the manufacture, we anticipate with no small degree of confidence, that we shall, by our best endeavours, perpetuate the high character of the* Instrument *which the* Inventor *has acquired by his ingenious improvements in the application of statical principles, and his various inventions appertaining to the apparatus, combining facility and despatch, before unknown for purposes of weighing. As the System is susceptible of being adjusted to* Foreign Standards *with precision, its accuracy has not only been tested at* Home, *but acknowledged in some of the most commercial nations* abroad.

We respectfully tender to you our readiness for meeting your orders for Balances and Apparatus at the most reasonable rates which they can be afforded, while they embrace all the necessary requisites for ensuring despatch, durability and precision.

Respectfully Your Obedient Servants,

ALVAN BABCOCK.
HENRY PLYMPTON. Surv.g J. Partr.

Alvan Babcock *embraces this opportunity to inform the Public, that the* Adjustable Iron Weights, *cast with a cavity within, and secured by a screw in the bottom, are his Invention, for which he holds a* Patent, *and that he never has disposed of the right to any one, except to* Benjamin Dearborn, Esq. *He therefore cautions all persons against* manufacturing, vending, *or* useing *those* weights, *except in the single instance above authorized by the Patentee.*

Having transferred to Messrs. Babcock & Plympton *my entire Stock of Balances and Apparatus, with the right of making and vending similar articles in future, as above stated, I take pleasure in recommending them to the Patronage of the Public, as possessing that Discretion and Fidelity which merit unlimited confidence, united with their Experience in the manufacture during many years, in the most assiduous endeavours for producing a System of Weighing, remarkable for its Accuracy, Despatch, Convenience, and Economy.*

BENJAMIN DEARBORN.

Boston, January 1, 1828.

Leaflet of Jan 1, 1828. [Unfortunately it was impossible to copy this fragile document any more clearly.] Below PATENT BALANCE Plympton has written *Henry Plympton Sole Successor to the Patentee.* Below ALVAN BABCOCK & CO, he wrote *Henry Plympton Surv.g Partner.* On the reverse is a hand-written note dated March 22, 1831, *Please preserve this moddle with the case which contains it, with care & when done with the same, please return it without delay & inquiry to Yr Hble Servt Henry Plympton.* Note the picture of Dearborn's patent steelyard at top left, and the Bank scales on which Edward Howard worked, at top right. Courtesy J Katz

Finding a Latvian Steelyard

BY L & P MARSON

At the New Orleans Convention in 1996, an interesting steelyard was shown, with a movable fulcrum and load mechanism. I have a similar scale, bought in 1992. To grasp the flavour of purchasing in the context of Latvia in 1992, the personal background helps us to visualize the impact of travelling, searching and communicating at that time.

During the independence period 1918-1940 the population of old Latvia was composed of 55% Latvians who ruled the country, and 45% Russians. The Russians were not given the right to Latvian citizenship unless they resided there for at least three generations. The situation today is still the same. Even though, in the old Czar's Government and under the USSR rule, everybody studied and spoke Russian, the Latvians proudly kept using their own language and maintained their bilingual identity as their heritage, analogously characteristic of other European areas of today's border settlements.

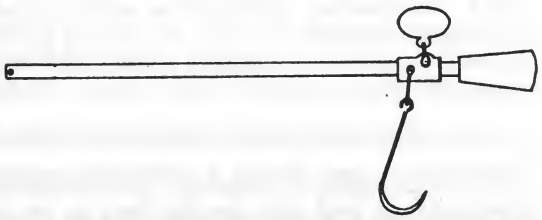


Fig. 1. The steelyard is made of brass, 509mm (20¼ins.) long, with an attached poise at one end of the graduated beam and with a stop knob at the opposite end of the beam. The scale is dated 1853 and can be identified as Latvian by its markings.

Before World War II my younger brother Paride and I were amateur Esperantists using Esperanto as an international language for communicating with foreign countries where we could not speak their language, such as the Baltic states. Half a century later, both retired, we use English for foreign travel and distant contacts, except that he, still actively engaged in Esperanto affairs, did not stop participating in international conventions. In April 1992 he went to one called *Baltoj Esperanto Tagoj* held at a Convention Centre in Jurmala, the littoral zone next to the sea, and the Baltic beach of the Latvian capital, Riga.

Riga, a city of 350,000 people in 1939, more than doubled its population in the post-war peace boom, growing to a city of 875,000 in 1984. Now it is the cultural and industrial centre of the country, specializing in manufacture of heavy equipment and in production of mechanical instruments.

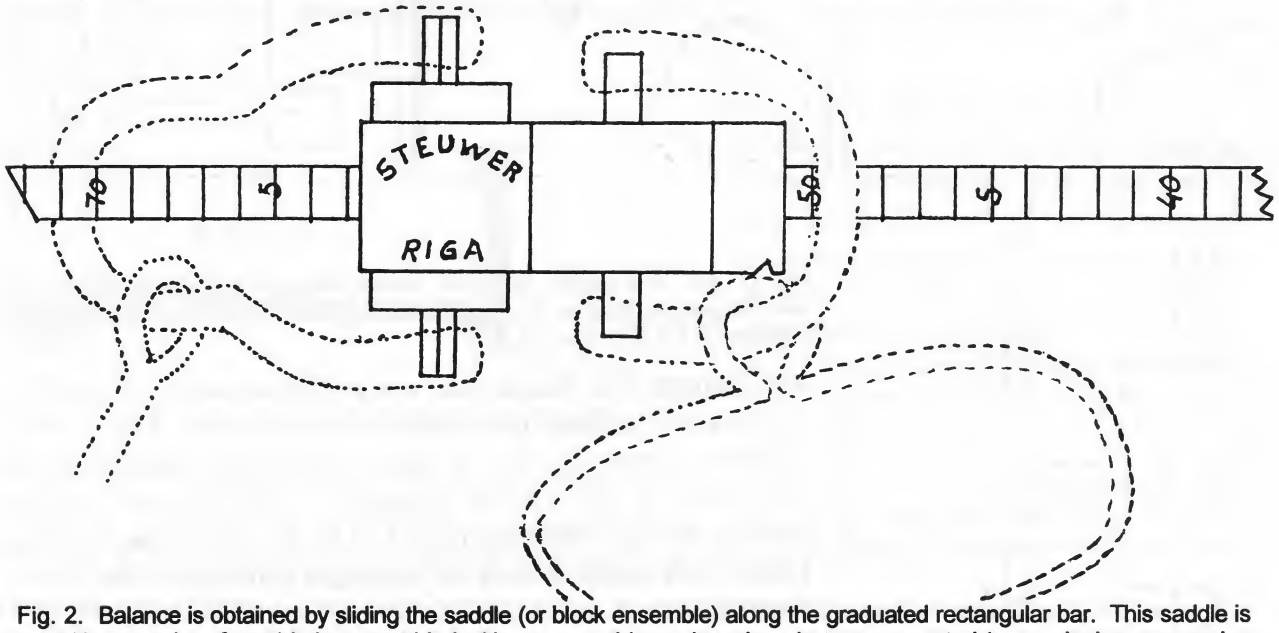


Fig. 2. Balance is obtained by sliding the saddle (or block ensemble) along the graduated rectangular bar. This saddle is set with two pairs of steel knives, provided with upper and lower iron rings in turn connected to a swinging suspension handle and to a loading hook as depicted in Fig. 1. The instrument is like the one shown in EQM p 315.

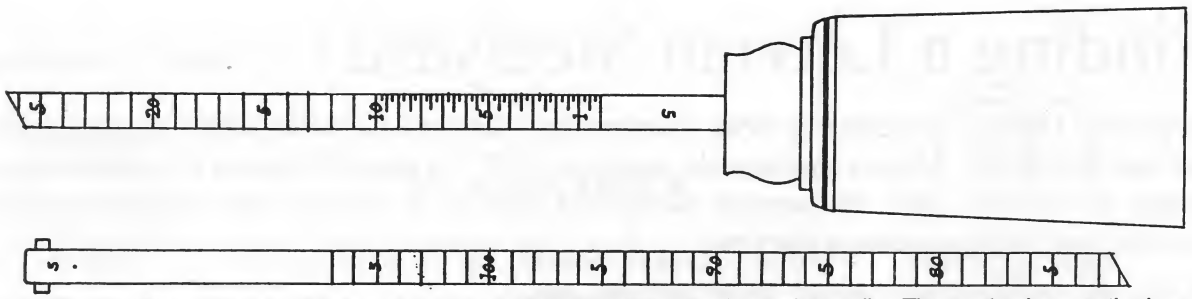


Fig. 3. The maximum capacity of the scale is a load of 42.8kg. determined experimentally. The graduations on the beam are marked decimally (1, 5, 10, 20, etc., up to 105, plus two individual marks) expressed in Russian pounds (1-lb = 0.409527kg.) thereby suggesting a theoretical maximum load of 43.819kg (96-lbs). Russian weight standards were imposed in 1846, according to Tate's *Modern Cambist*, 1908, p 103.

To reach that destination, Paride had a round-trip ticket from Italy valid for 15 days, an above-average "permissible" stay during a politically-unstable intermission period. The country had just regained its independence and was on the way to its pre-WWII era of freedom, but life was still the Russian-occupation style. It was a Russian freedom that can be likened to the period after the fall of the Berlin wall.

Inflation was rampant. Two currencies were still legal: the Russian rouble and the Latvian rouble. The predominant Latvian rouble was replaced less than a year later by the *Lat* which today is worth about two dollars.

Towards the end of the fifth day at the congress Paride was standing in the hall of the Jurmala Hotel looking for information to enable him to move to another hotel near the city centre. At the reception desk no one spoke English, but a hostess told him that a certain Mrs. Nadejda spoke good English. She was an Esperantist about to leave the main hall, presumably to go home. Surprised by the unexpected inquiry and pleased to discover a double language in common, she invited him to be her guest at her residence in Bulduri, about 15km from Jurmala. Both cities were connected with Riga by a metro-politan-type train line.

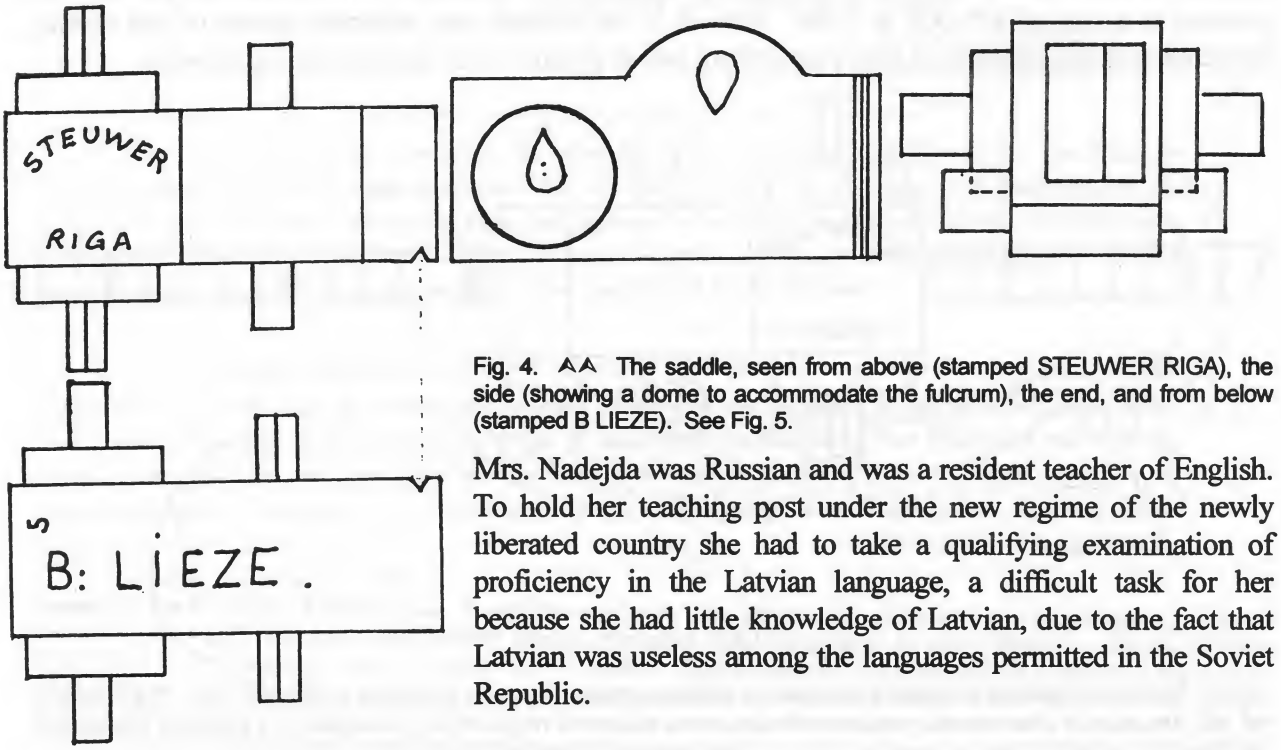


Fig. 4. AA The saddle, seen from above (stamped STEUWER RIGA), the side (showing a dome to accommodate the fulcrum), the end, and from below (stamped B LIEZE). See Fig. 5.

Mrs. Nadejda was Russian and was a resident teacher of English. To hold her teaching post under the new regime of the newly liberated country she had to take a qualifying examination of proficiency in the Latvian language, a difficult task for her because she had little knowledge of Latvian, due to the fact that Latvian was useless among the languages permitted in the Soviet Republic.

Once acquainted with Mrs. Nadejda, Paride planned to utilize the new friendship for an opportunity to tour the capital and to take advantage of her courtesy in accompanying him to Riga to visit churches, monuments, and shops. The latter exploration turned out to be a visit to old and new free-enterprise shops which in this political climate carried exclusively items of domestic or imported new production.

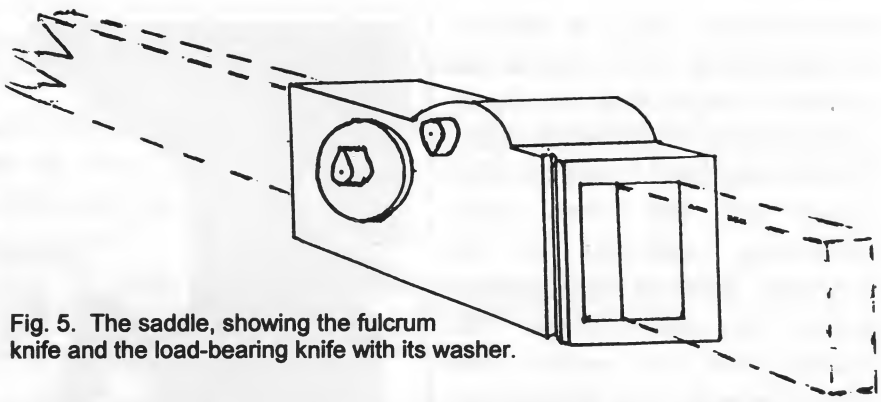


Fig. 5. The saddle, showing the fulcrum knife and the load-bearing knife with its washer.

In the very central section of *Brivibas Iiela* (Freedom street) there is the University campus with many buildings of 19th-century style architecture, a place to possibly find a shopping area for art-crafts and the like. Nearby there was another street called *Merkela Iela*, where, with exuberant satisfaction, he found an antique shop. The visit was a disappointment. The antiquarian of that shop had mainly icons, coins, necklaces, and other stuff strictly for the tourist trade, not what he expected.

Proceeding towards the Railroad Station with his Russian lady guide, he inquired about how to find a shop of older stuff, hoping to come across an antiquarian book-seller or a philatelic merchant, but again with not much luck. Finally on the street *Marijas Iela* nearby, there was a store of old books, coins and philatelic supplies where he asked for scales and weights, collectibles of potential interest to his brother, the ISASC member. The answer to him was the standard clichéd reply he got in the previous stores, that *they were all sold out* and the emptiness of the shelves proved it.

Disappointed, he reconciled himself to buying what he did not really want: some Riga postcards, a Genova [Genoa] picture album of the 1800s, and insignificant paraphernalia, best described as trash, unsuitable even for a swap-meet. Then browsing around again, he noticed a glass-enclosed curio storage cabinet where, on the bottom shelf, buried under piles of antique lithographic prints, an oxidized graduated brass bar was sticking out, an out-of-place piece that should not belong in a curio cabinet. It was a scale! However it was too heavy and too bulky. Hence he went on, passed it up and did not buy it.

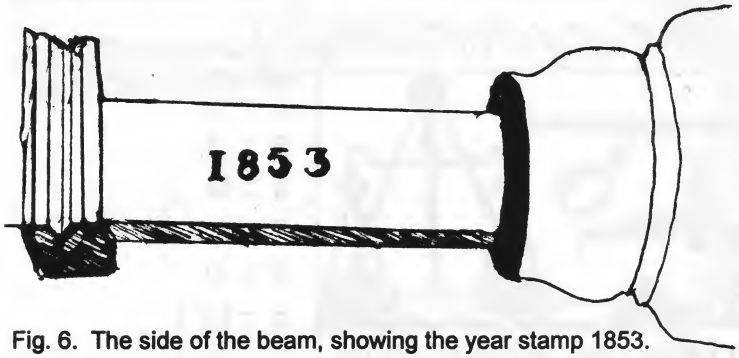


Fig. 6. The side of the beam, showing the year stamp 1853.

Two days later he went back to Riga alone for more touring, more wandering around and hunting. Frustrated by the lack of anything worth buying and in a desperate attempt to get at least a modest souvenir of his visit, he ended up purchasing an Italian-Russian dictionary and a book on Latvian art as a consolation prize for his labour. At this point, exhausted and exasperated, he gave up further searching, and yet, upon thinking of the approaching expiry date of his flight-ticket and visa, he thought, as a last recourse, he might go back to the philatelic antiquarian where he had suddenly spotted the scale, in the foolish hope that a second look might turn up something else.

The scale was still there, unmoved and untouched. Surprised that nobody showed any interest in it, this time he bought it, although with extreme reluctance, because it was extraordinarily heavy and

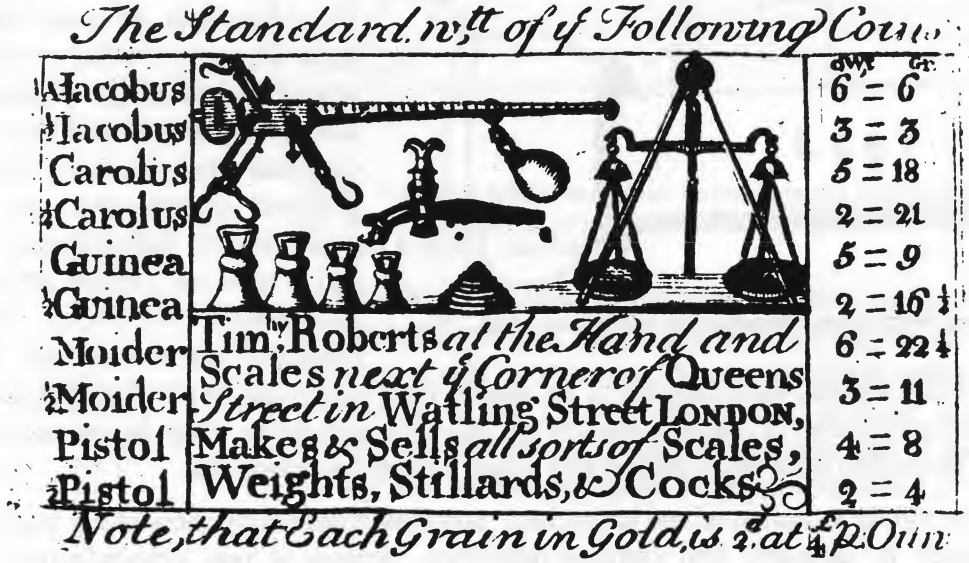
uncomfortably bulky, in addition to anticipating how serious an obstacle it might be at any airport metal-detector on his return flight. On the other hand it was the only choice left that was worth persevering with, to fit the awkward taste of his brother's hobby, if the price was right. His intuition for the esoteric was correct because I was delighted by such a brass scale with its intriguing movable fulcrum mechanism, its shiny yellow brilliant metal, its exceptional condition for its age, and the richness of its distinct marks of origin and verification.

As in the last century, the port of Riga had an active commercial exchange with Western Europe and it served as a marine base for a Latvian Atlantic fleet of fishing boats; it seems logical, or likely, that this scale had been used by those fishermen.

Fig, 7. AA Map of the Baltic Sea, showing Denmark at its mouth and Latvia on the east of the Baltic Sea, protected from storms from the west, but shut by ice for part of the year. Note the proximity of Russia to the east of the Baltic States.

Trade Card

Timothy Roberts was working from 1695 until 1731 alone, then with his son, Richard, until 1744. This is his earlier shop and the date of this trade card cannot be pinpointed, but the coins were current between about 1700 and 1730. Note the similarity of this steelyard to that of Wm Ball, on page 2389.



More Saddled Steelyards Compiled by D F Crawforth-Hitchins

The steelyard described by Lucio Marson on pages 2377 to 2380 is interesting because it is so incredibly similar to one owned by John Knights and the one shown in fig. 1, the only obvious differences being the size of the poises and the units.

Owner	Length	Capacity	Units	Markings
Marson's	509mm	43.81kg	409g, 105 Russian Lbs	LEUWER RIGA B LIETZE 1853
Knights'	700mm	46.1kg	423g, 109 Swedish Lbs	LEUWER RIGA 1857
MAC's	504mm	23.66kg	363g, 60 Lithuanian Lbs?	REUSS RM

These three are particularly attractive because they are made of exceptionally yellow brass, (see fig. 1) a contrast to another saddled steelyard, bought in Edinburgh, which is polished steel with a brass saddle and a wooden handle. See fig. 2. Because it has the four-lobed crown with a small cross above stamped on the beam and on all eight facets of the poise, it is probably Swedish (Sweden is north-east and across the Baltic Sea from Latvia), and because it has 04 stamped on it, probably because it was verified in 1904. The shape of the poise and the shape of the handle are just like the shapes used for the bismar held by a Finnish fishwife, shown in Rush and O'Keefe's book *Weights and Measures*, p 28, and very similar to the bismar shown in Fig. 3. Although the rectangular beam and the chamfered poise are both cast in steel, the other parts are relatively crudely-made from folded sheet. Its capacity is only 10kg (22-lbs) but it conforms with modern ideas of letting the customer know that it is an honest instrument, that is, it starts at zero, not at one pound.

Only one British example is recorded, a small one only 12ins. (300mm) long, in the Avery Historical Museum. See Fig. 4. The poise comprises two discs screwed to the beam, and the beam is graduated

Fig. 1. AA Saddled steelyard, possibly Lithuanian, stamped REUSS and RM. Exceptionally yellow brass. Very rounded iron shackles, handle and hook. Not verified. Note how close the fulcrum is to the load-bearing hook, giving a high weighing capacity with a small poise, but sacrificing accuracy for convenience.

Fig. 2. AA Steel saddled steelyard with brass saddle and wooden handle, capacity 10kgs. Length 677mm (26½ins). Total weight 1.43kg. Verified on all parts with a crown, and with 04 on the poise. Units spaced evenly 6mm apart, a sure sign of a normal steelyard. Compare with the bismar in Fig. 3. Note that it weighs only half what the bismar weighs, but has the same capacity.

Fig. 3. AA Bismar in the same style as the saddled steelyard in Fig. 2. Capacity 10kgs. Length 835mm (32½ins) long. Total weight 2.72kg. Verified with a four-lobed crown, and with 94 and 38 on the poise. Units spaced unevenly, the greatest spacing between 0 and 1, being 177mm apart, 1 and 2 being 100mm apart, and 9 and 10 being only 9mm apart, so particularly accurate for items below 2kg in weight. Probably Swedish.

0-to5-lbs by ounces. The sliding beam works like the others, just sliding through the saddle, but it has an inner tube that can be pulled out for measuring *length* only, then securely pushed back into the beam to allow accurate weighing. The extended beam is graduated 0 to 16 inches on the back, leading one to suppose that it was intended for fishing competitions, where fishes below four inches long were not permitted to be included in the catch, and with a second clue that the hook is particularly sharp, a common feature of anglers' scales.

A useful saddled steelyard was the milk scale made by A PRUTSCHER in Sonthofen, Germany, a little village in the Alps, a few miles from the Austrian border. It has the serial number 2987, suggesting that this was a popular scale made in large numbers. The U-shaped bar is graduated from 0 to 15kg. It has an interesting tare-bar to adjust the steelyard to zero with any weight of bucket (within reason). The saddle has a metal bar attached to its rear, and this tare-bar can be slipped away from or towards the

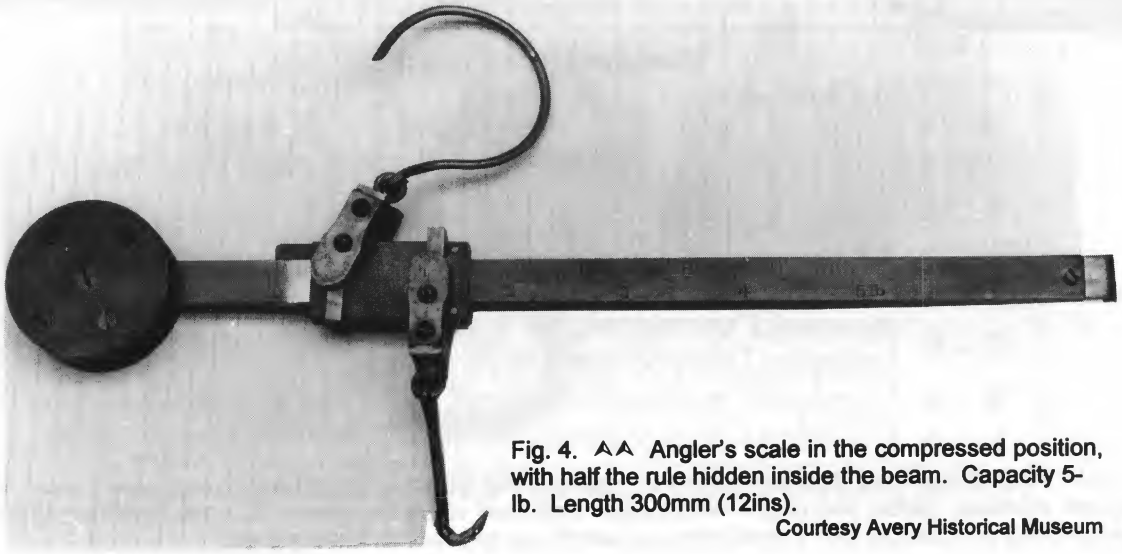
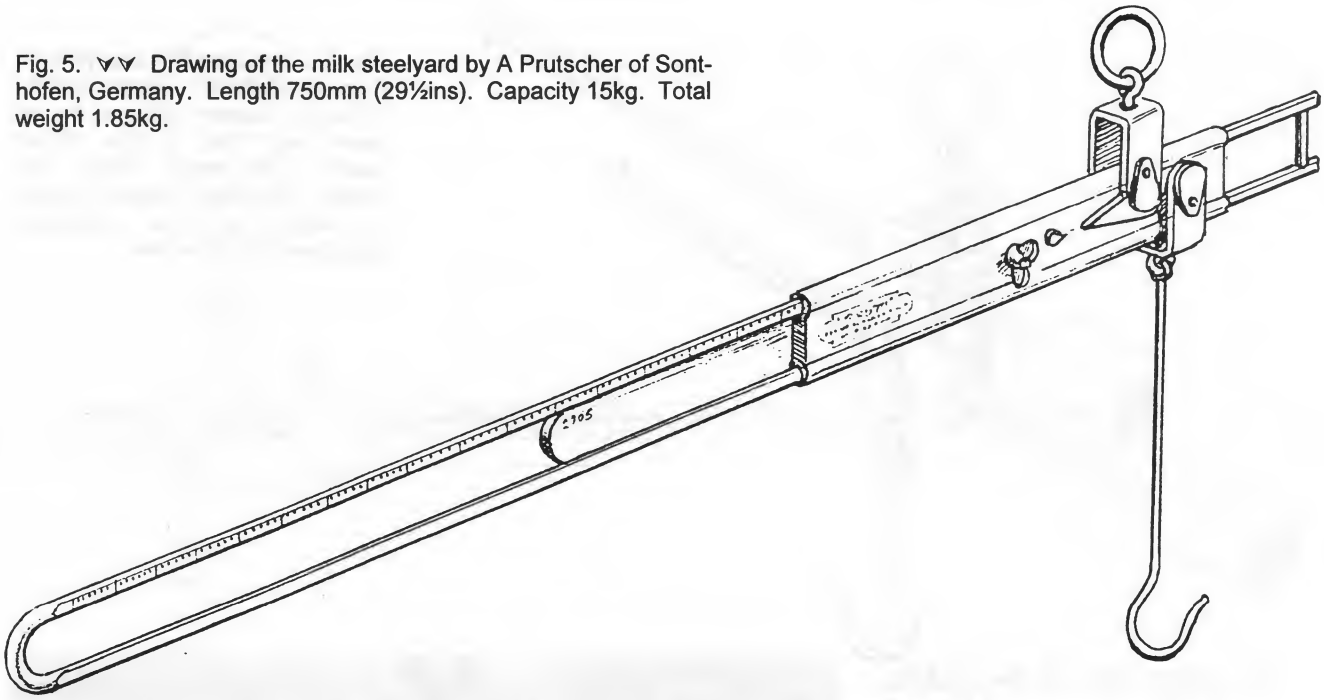


Fig. 4. AA Angler's scale in the compressed position, with half the rule hidden inside the beam. Capacity 5-lb. Length 300mm (12ins).
Courtesy Avery Historical Museum

Fig. 5. ⩔⩔ Drawing of the milk steelyard by A Prutscher of Sonthofen, Germany. Length 750mm (29½ins). Capacity 15kg. Total weight 1.85kg.



fulcrum, allowing for a empty bucket up to 1.5kg in weight. The workmanship was more elaborate than that of the previous steelyards, having a cast U-beam, cast tare-bar, and cast block for the saddle. Although the U-beam slides through tubes made of sheet-brass screwed to the saddle-block, and the bearings are only bent sheet-iron, the ends of the knives are covered with dust-caps, and there is an indicator to show when the beam is horizontal.

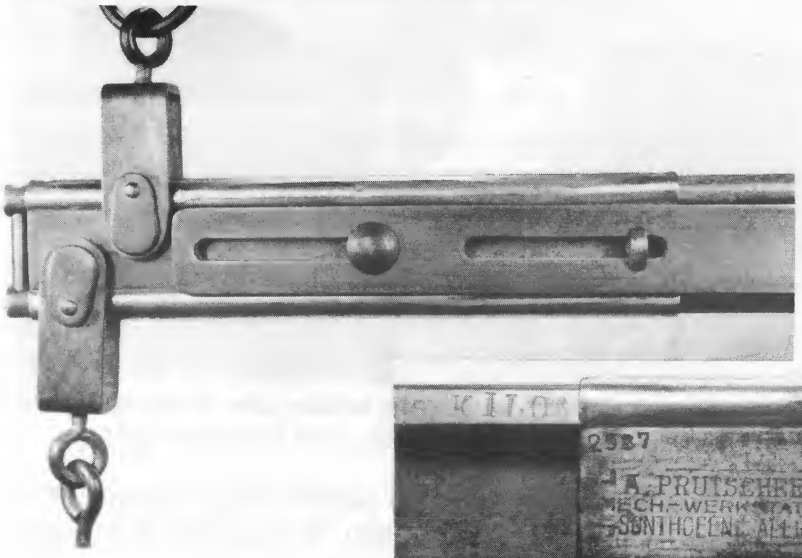


Fig. 6. ⩕⩕ The back view of the Prutscher steelyard, showing the slots cut in the tare bar to allow it to be positioned for a particular bucket. Note the neat dust caps. Note the proximity of the fulcrum to the load-hook.

Fig. 7. ⩔⩔ The front view of the saddle 2987 and A PRUTSCHER MECH-WERK-STATTE SONTHOFEN ALLG and DRGM. Note the wing-nut acting as a break on the tare-bar. Note the triangular indicator (not a knife).

The FUCOMA was made in Berlin N65, and is more sophisticated in concept. Figs. 8 & 9. The saddle has two beams going through it, the upper one of 10kg and the lower one with a bigger poise, of 12kg. The upper one has a knurled knob which can lock the beam onto the saddle in any chosen position, either as a tare-beam, or after one item has been weighed. The lower beam can then be brought into action, to weigh the contents of the tared container, or to add to the load already indicated by the upper beam to take the maximum load up to 22kg, or thirdly, to hook on a second item to be weighed independently of the first load. The saddle is well-machined out of brass with a flat plate screwed onto

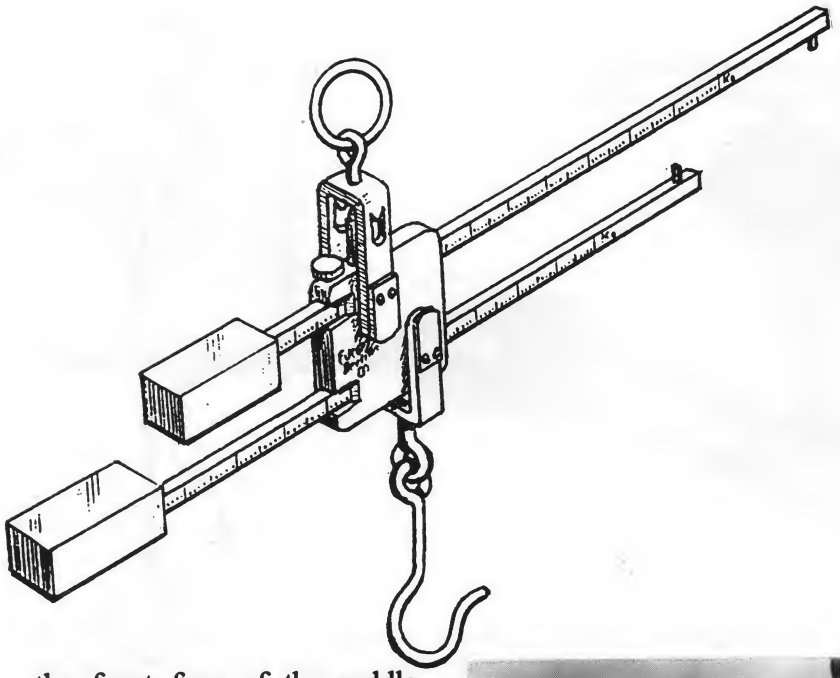


Fig. 8. ≺≺ Saddled steelyard by Fucoma of Berlin. Length 400mm (15¾ins). Capacity 10kg on the top beam and 12kg on the bottom beam. Total weight 1.91kg. Not verified, but possibly made for use in a factory or the wholesale department of a chemists.

the front face of the saddle after the two beams were fitted into their channels. The iron of which the rest of the steelyard is made now looks dilapidated, as the nickel-plating is lifting, although originally it must have looked reasonably attractive. The date is unknown, but around 1910 to 1920 seems reasonable.

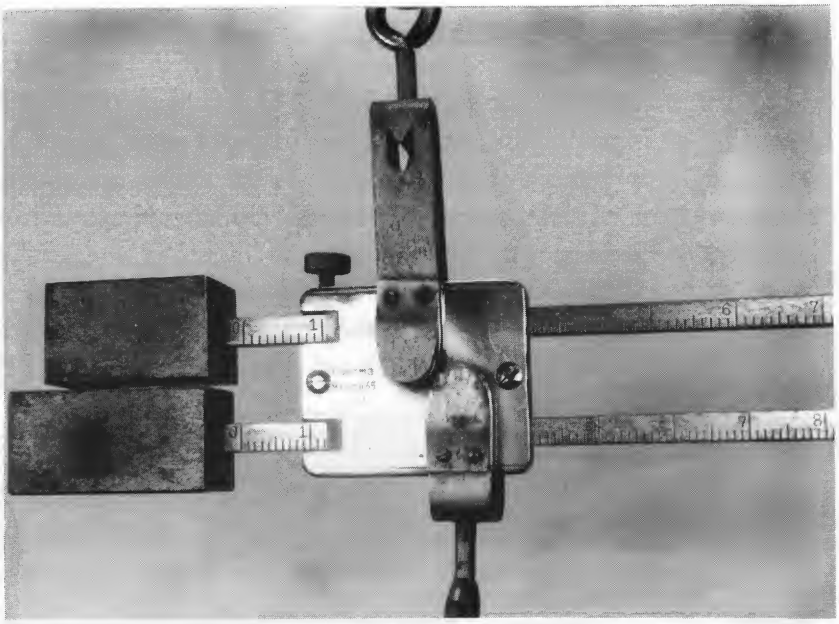


Fig. 9. ≺≺ Fucoma steelyard, showing the smaller poise at the top and the knurled knob to act as a break for the top beam. Note the simple sight-hole.

Dating saddled steelyards is difficult while evidence is so sparse, so Marson's dated scale of 1853 is invaluable in giving us a first known date.

Two diagrams in Brauer's book *The Construction of the Balance*, pages 27-37, implies that Brauer was quite familiar with the saddled design, (both with a straight beam and with a U-shaped beam), when he wrote his book in 1880. It is possible that Brauer was actually thinking about that specific Prutscher scale with a U-shaped beam shown in figures 5, 6 and 7, which hints at a date prior to 1880 for Prutscher's design.

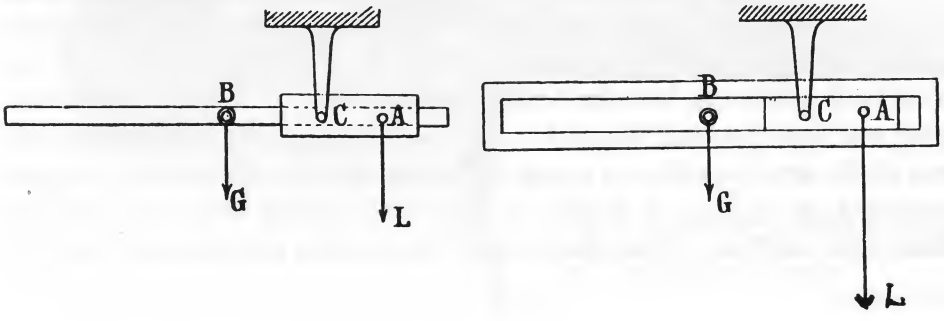


Fig. 10. ≺≺ The diagrams from Brauer, showing the centre of gravity of the ordinary saddled steelyard on the left, and of the steelyard with the U-shaped beam on the right.

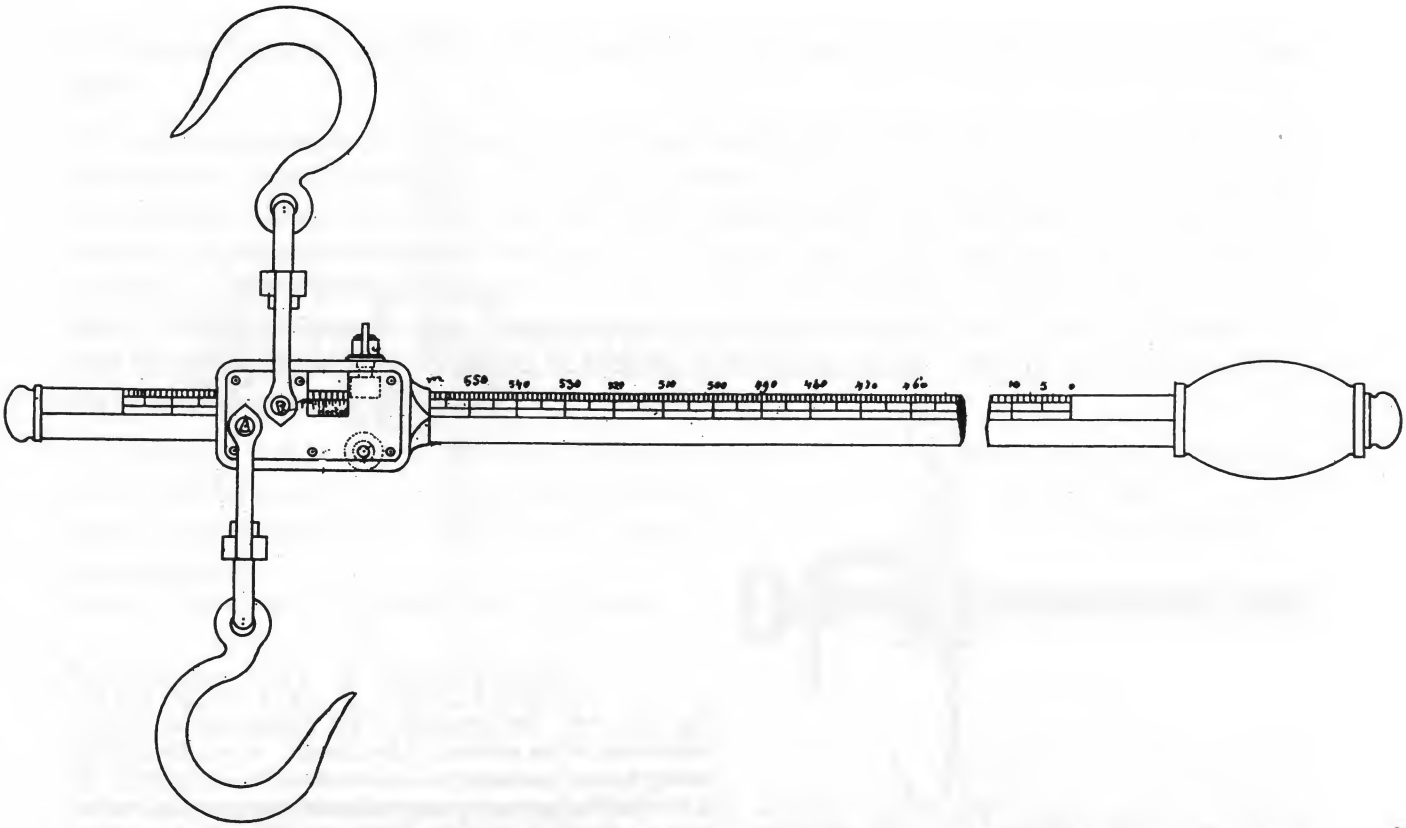


Fig. 11. ⍓⍓ Arnaud and Gaytté's steelyard patented in 1882. It was designed to be held up in the left hand. Note the window in the saddle, finely graduated with sub-divisions. The wing-nut on the saddle fixed the beam so that a load could be added gradually until the load reached the weight indicated.

Another clue to dating was the British patent of 30 March 1882 taken out by two Frenchmen, Pierre Arnaud and Léon Gaytté of La Ciotat, (on the coast between Marseilles and Toulon). See fig. 11. The steelyard looks highly professional, as it had a roller-bearing in the saddle, under the beam, to facilitate the sliding of the beam. There was a finely graduated section on the saddle next to a window in that saddle to enable the user to recognise sub-divisions between the divisions on the beam. Inserted in the top of the saddle was a break that trapped the beam in any desired position. Any knowledge of this steelyard's having been manufactured would be helpful to ISASC members.

In 1888 the Scientific American published a brief paragraph about Thomson's Weighing Scale. ***An Improved Weighing Scale.*** *A device to facilitate the convenient weighing of a wide variety of articles, and which has but few parts and can be economically constructed, is shown in the accompanying illustration, and has been patented by Mr Waddy C Thomson of Lancaster S.C. The scale beam is arranged to slide in a suspended piece or box, so that at every sliding or shifting one end of the beam will project more and the other end less from the point of suspension. The weight is a constant, permanently fastened to the sliding beam, there being a larger*

Fig. 12. ⍓⍓ Thomson's Weighing Machine, patented in 1888.

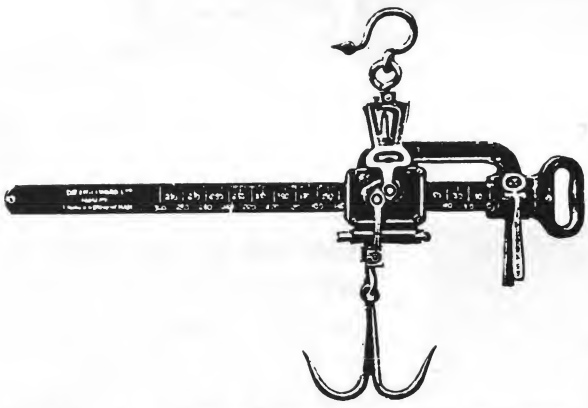


Fig. 13. ⋀⋀ Day & Millward Ltd, 1924 catalogue, butchers' steelyard, the 'Premier', made with capacities of 250lbs, 300lbs or 350lbs. Cost £12:12:0, £13:6:0, or £14:5:0 respectively.

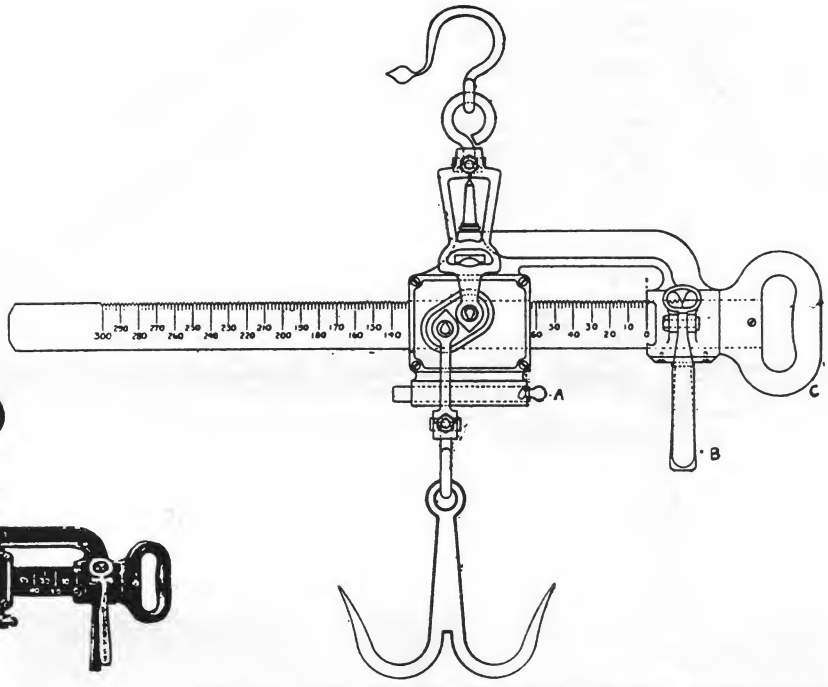


Fig. 14. ⋀⋀ The drawings in the Notices gives a much better idea of the subtlety of this design. **A** is a secondary sliding beam, graduated in 4oz divisions from 0 to 2lbs. **B** is the handle for moving the graduated beam as required to balance the load. **C** is the handle for lifting the pawl [nib] clear of the notches. Note the extension to the right that prevents the beam from dropping while the load is being applied (a serious defect of saddled steelyards!).

weight attached to one end and a smaller one to the other end, both weights and beam adding to the capacity of the scale. Removable weights are not required with their liability to being mislaid or dropped.[1] Apparently it was not in production in 1888, but it would be exciting to discover that an American company did take up the idea and manufacture saddled steelyards.

A rather elaborate version of a saddled steelyard was issued with a certificate by the British Board of Trade, that the pattern was not such as to facilitate the perpetration of fraud, in 1919. Figs. 13 & 14. It was *constructed on the principle of the Danish steelyard.* Day and Millward Ltd, of Birmingham submitted the design, and were still selling it in 1924 at a higher price (£14:5:0) than their conventional butchers' steelyards (£9:12:0). This steelyard not only had a sliding beam, but had a second little sliding beam through the bottom of the saddle. The catalogue called it *The Premier Steelyard. Patent. Approved by the Board of Trade. Designed to meet Board of Trade Regulations. Weighs to full capacity without adjustable ball or runners. Very accurate and highly finished.* The patent date was 20 February 1919, for *Improvements to steelyards.*[2]

It is interesting that the Board of Trade defined it as a *Danish Steelyard.* Many visitors to Denmark have seen saddled steelyards in use for weighing fish, although no picture was available for publication here. Another name that might seem appropriate might be *Baltic Steelyard*, although that name ignores

Fig. 15. ⋖⋖ Rhewa of Mettman, Germany, offered this egg scale in their 1936 catalogue, as being suitable for dealers in eggs. Capacity up to 25kg!

the other countries that made them. Undoubtedly they were used with particular frequency in the Baltic region.

The most recent mention of a saddled steelyard was that offered in 1936 in the catalogue of *Rhewa*, (the trade name of August Freudewald of Mettman, Rheinland, Germany). See Fig. 15. It was an egg scale for weighing a basket full of eggs, and the Rhewa catalogue made no comment on the design of the steelyard (a steelyard is called a *schnellwaagen* in German, a *quick scale*, which seems a good name for it), except to offer it in four capacities, 5, 10, 15 or 25kg. Could 25 kilos (55lb) of eggs be put in a basket without the bottom ones being crushed? It could be supplied with various containers, and could be used either with the container or without, just using the hook. They do not show or explain how the container was tared.

It is difficult to believe that we have been fortunate enough to find the first and last saddled steelyards, and we look forward to more evidence being produced. Until then, we are immensely grateful to Lucio Marson for informing ISASC about his rare scale and stimulating this first look at saddled steelyards.

Acknowledgments.
Thanks to Howard Green, John Knights, and Lucio Marson.

Notes & Queries

N & Q 141 — Reply from G ZAVATTONI

Here is my answer to the query on page 2351. The weights shown are *denari* weights used for weighing coins in the absence of proper coin weights; they could also be used as apothecary weights or bullion weights.

They were generally made in the Lombardy area and were based on the Milanese pound (1 pound = 352.4gr divided into 12 ounces of 29.3gr for a total of 288 denari of 1.22gr each.)

There are full series from 1 to 6 denari of which some were home-made (no marks or stamps) and some were made by scale-makers (various marks; letter D for denari, other letters, bishops, town arms, fleur de lys, stars, etc.)

It is true that in general a stamp of a bishop is a verification mark, but in this case I believe that the mark only indicates the manufacturer; I own one that bears the bishop marks in the number corresponding to the denari, but it is also countermarked for verification on the back with just one bishop. The numbers under the bishops drawn in Equilibrium are to be read as 1698 and 1755. These are the marks planned in the Bando of 18 August 1698 (scale-maker and adjuster Giovanni Bozzo) and 16 July 1755, (scale-maker and adjuster Giacomo Sala, successor to Bozzo). It is difficult to identify the other bishop marks since there are no clues (letters, dates, etc.). This uncertainty also applies to the weights shown in Vangroenweghe and Geldof's book *Pondera Medicinalis.*

The Bandi set out the selling price of the weights, the price of the denari weights being one soldo each, while the biggest of the series - the ducatone - being 5 soldi. It is remarkable that the price of the weights was the same both in 1698 and in 1755. Inflation was low at that time!

Editor - What a wonderful response to the query by V Jones! He was delighted with this information.

Notes & References

Borzone, P, I *Pesi Monetari di Monete Non Italiane, Catalogo delle Civiche Raccolte Numismatiche di Milano*, 1988, Figs. XVIII, XIX, XXIV.

Vangroenweghe, D, & Geldof, T, *Pondera Medicinalis, Apothekersgewichten, Apothecaries' Weights*, published Brugge, by the authors, 1989, Figs. 139, 140, 141.

William Ball of Bister

BY A V SIMCOCK

The Museum of the History of Science, Oxford, has purchased an important eighteenth-century English steelyard,[3] which enhances both its collection of weighing instruments and, more surprisingly, its collection of the work of local clockmakers. It is stamped W BALL BISTER; 220 and it came to the Museum's attention through an enquiry as to whether we knew anything about this local craftsman, the place-name being the small Oxfordshire town of Bicester (pronounced, and in old documents often spelled, Bister). In fact the Museum has three clocks bearing this maker's name, which are probably the work of three generations of the same clockmaking family, as identified in my revised edition of Beeson's *Clockmaking in Oxfordshire*.[4] Until now, however, they were not known to have made anything other than clocks; so the steelyard is an example of how an object can carry information not recorded in other historical sources.

Fig. 1. Steelyard by William Ball of Bicester, stamped W BALL BISTER 220.

Traditionally, the church clock and the steelyard would both have been products of the versatile rural blacksmith, from whose craft has evolved various product-specialisms, including clock-making and scale-making. Between the extreme specialist and the general-purpose smith, there were men who had special skills appropriate to a variety of products; a contemporary example in Bicester was Edward Hemins, also best known to posterity as a clockmaker, but who was a bell-founder, gunsmith, and locksmith too - in other words, a kind of scientific blacksmith capable of making a range of technically demanding mechanisms as required by the local community.[5] There is no reason to doubt that the maker of the steelyard, then, could also have been a clock-maker.

Three William Balls were clock-makers in Bicester, spanning the eighteenth century. In each generation, father and son doubtless worked together for many years, making it hard to differentiate between them. The eldest was already married and working by 1701; and the Museum's handsome 8-day longcase clock dating from about 1710 shows that his work was of a high standard. It is signed: W^{m} Ball of Bister: fecit. The same man regularly maintained the church clock of St Mary Magdalen, Oxford, from 1722 to 1736 at a crown (2/6, or £0.25) a year. Although this is a routine type of arrangement, it is very unusual for Oxford - a cosmopolitan city with clock-makers of its own - to engage an out-of-town craftsman (Bicester is 12 miles from Oxford). Like the longcase clock in the Museum, it indicates that William Ball was no rustic blacksmith but a man with competitive skills, capable of working in the mainstream style of Oxford and London. Curiously enough, this is also true of the steelyard - it is not an idiosyncratic piece of provincial smithing but, to all appearances, the product of a craftsman trained to London standards. However, Ball's name has not been found in London apprenticeship records. There was a William Bull, who came from Oxfordshire as an apprentice who served under several masters in Blacksmiths' Company, one of them from 1710 to

1713 being John Picard, a well-known maker of weighing instruments; but, given the date, it is clearly not our William Ball.[6]

The second Bicester clock-maker of this name was working from the 1730s, and died in 1786. Most of the Ball clocks surviving from this period are relatively crude wall alarm clocks (of which the Museum has an example), and 30-hour longcase clocks, simpler than the 8-day clocks mentioned above. Of course, these cheaper clocks represent the needs of the market rather than the best skills of their makers.

The third William Ball was born about 1738 and died in 1823. He was the maker of an 8-day longcase clock of the 1770s in the Museum's collection. He, and to some extent, his father too, generally signed their work with the modern spelling of Bicester. Although we cannot rule out any of the three generations, on balance it seems likely that the first William Ball, living and working from about 1700 to the 1730s, was the maker of our steelyard.

The steelyard, shown in Fig. 1, is made of wrought iron, 32 inches (725mm) long, and has a capacity of 220 pounds. It is a turnover steelyard, meaning that it can be used both ways up, with graduations on two sides of the diamond-sectioned arm or 'blade'. One set of graduations is from 2 to 50 pounds in units of a quarter pound, the other from 40 to 220 pounds in units of one pound. The indicator for these scales is a sliding ring, on which the counterpoise weight or 'poise' hangs. The poise appears to be a cast iron shell filled with lead and weighs about 8 pounds, though there was no strict standard as each poise could be unique to its own instrument. A disc on the end of the blade prevents the ring falling off. The large double hook with sharp points, which turns over the end to hang either way, carries the load to be weighed (a sack of grain, a side of beef, etc.) The suspension hook nearer the load-bearing hook goes with the higher capacity graduations, the further suspension hook with the lesser graduations. The pivots on which the suspension hooks are held form the fulcrum of the balance; and the trefoil-tipped pointers above them align with the suspension shears when the blade is horizontal, and are thus crucial to the visual determination of the point of balance. The pivots are pippin steels with knife-edges and are in a horizontal row, rather than offset (so as to put the bearing tips into a straight line);[7] it is therefore less accurate - though, at best, steelyards are only modestly accurate instruments.

Actually, acquisition of this steelyard immediately provoked discussion of this small technicality - offsetting the knife-edges - because its absence was one of the several characteristics initially thought to suggest a comparatively early date (before about 1750) for this instrument. Offsetting became the norm seemingly through the influence of Thomas Beach[8] of Birmingham, the best known maker of English steelyards in the second half of the 18th century (1760s-1790s).[9] However, an earlier turnover steelyard in the Museum, made in the period 1700-1720 by the London scientific instrument maker John Rowley[10], has accurate offsetting of the pivots, so the story of this technical detail is not so simple.

It does not affect our view of William Ball's steelyard as belonging to the early or middle eighteenth century, its hand-wrought workmanship being typical of the period, from the solid virtues of the heavier parts to the delicacy of the curls on the ends of some of the hooks. Moreover, it is the earliest example presently known with the design characteristics that become typical of English steelyards thereafter. The spade-shaped end and the club or trefoil pointers are the most obvious of these features, and have been the universal style for English steelyards from the time of Thomas Beach to the present century. The Museum displays a typical nineteenth-century specimen by Beach's eventual successors, the famous W & T Avery[11] of Birmingham, the stylistic resemblance of which to William Ball's steelyard is most striking.

Ancient though the principles of the unequal arm balance are, examples made before the industrial era are not common. The small collection in the Museum of the History of Science, which is a museum of

scientific instruments, consists mainly of examples of special interest in one way or another.[12] They include an incomplete small steelyard thought to be Roman,[13] a Russian bismar made of wood and dated 1724; various versions of the common Chinese miniature steelyard or do'tchin (sometimes erroneously called opium scales), notably a rare eighteenth-century English one by Benjamin Martin;[14] and, not least, the finely made brass steelyard by John Rowley mentioned above, which may well represent the nearest that the traditional steelyard ever came to being a true precision instrument.[15]

Notes and References

1 Barker, H, *Pictorial History of American Scales 1850-1950*, vol I, p 57.

2 Leeds City Library, patents department.

3 Accession no. 95-19, inventory no. 20532. This article is a revised and extended version of an article first published in *Sphera: The Newsletter of the Museum of the History of Science*, Oxford, no. 3, Spring 1996, 2.

4 Beeson, *Clockmaking in Oxfordshire 1400-1850*, third edition, revised by A V Simcock, Oxford, MHSO, 1989, 4, 8, 59, 86-7, 176-7, 194.

5 Beeson, op cit, 112-3, and see 5-6.

6 I am grateful to the Keeper of Manuscripts at the Guildhall Library, London, for kindly supplying details of this apprenticeship from the Blacksmiths' Company records.

7 Diana Crawforth-Hitchins drew this feature to my attention, and also helped me understand other technical aspects of the instrument.

8 Editor - Thomas Beach was only one of many steelyard makers, particularly in the Birmingham area, but very few steelyards have survived from this period, and a disproportionate number made by Beach can be identified. This might be because his steelyards were so well made that they continued in use when other steelyards were rejected, or be because he stamped his name clearly on each steelyard, and thus we can identify and date his work.

9 On Beach see Crawforth-Hitchins, D F, Thomas Beach, *Equilibrium*, 1499-1513, 1539-1548, 1572-1580.

10 On Rowley see my entry for him in *The Dictionary of National Biography: Missing Persons*, Oxford & New York: Oxford University Press, 1993, 572.

11 W & T Avery were successors to the business of Thomas Beach, through an intermediate chain of scale-makers.

12 Readers fired with enthusiasm to visit the Museum should note that it is closed this year (1999) for building work.

13 Simcock, A V, Roman Steelyard?, *Equilibrium*, 1819.

14 Martin, B, Monied Man's Vade Mecum, *Equilibrium*, 299-303.

15 An article about Rowley's steelyard will appear in a future issue of EQM.

Showcase

Eight escudo was also called the Spanish Doubloon or four pistoles, so two pistoles was half a doubloon.

Fig. 1. >> A set of Doubloon of 17 dwt 8 grains, 2 pistoles of 8 dwt 16 grains and 1 pistole of 1 dwt 8 grains. (Withers 1580, 1581 and 1582)

Snowshill Manor Collection

Fig. 2. ➢➢ Weights for bullion, for use between approximately 1836 and 1850, in the British colonies. Because the silver coins were so worn, they were weighed as a mass and the weights indicated the value. The smaller three are for values of 1/3, 2/6 and 5/-. However the largest one was for silver of a lower value, needing 34 dwt of silver to be worth 10/-, whereas, the silver of the smaller weights was of a higher value, needing 15 dwt of silver to be worth 5/-, and 30 dwt of silver to be worth 10/-. Values of silver fluctuated in various places and at various times, so it is impossible to identify where these weights came from, although it is possible to say that it was somewhere under British jurisdiction, as VR (Victoria Regina) was stamped on them.
G Houben Collection

Figs. 3, 4 and 5 were steelyards used to check full-weight, or nearly full-weight silver coins.

Fig. 3. ≺≺ Steelyard to weigh 1 escudos of 3.383g, 2 escudo of 6.766g, 4 escudo of 13.532 (half onza) and 8 escudo of 27.064g (one onza). Fine notches to find the loss of silver from the coin. Made of steel.
D Schmitz Collection

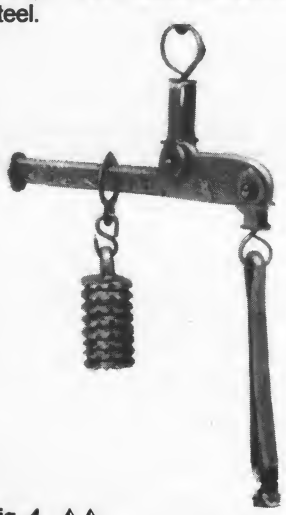


Fig. 4. ⩓⩓

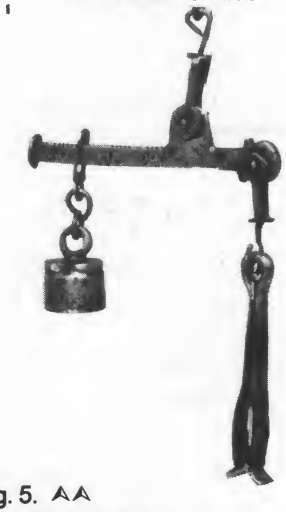


Fig. 5. ⩓⩓

Both steelyard made in Granada with dots to indicate coins.
Private collection

Fig. 6. ➢➢ English weights for silver coins and for bullion found in a box made about 1700. Rampant lion mark. The mark is not recorded in Withers, and may be spurious, but designed to give an authentic look to the weights.
Private collection

Review

Coin Operated Scales, Catalog # 18, by Bill & Jan Berning, 135 West Main Street, Genoa, Illinois 60135, USA. Published 1999. Available from the authors (or from the editor as a photocopy) free.

In one sense this is not a book, being a commercially useful 48-page leaflet, intended to facilitate ordering parts. The sub-title reads *Restored Scales, Used and Reproduction Parts, Identification Guide, Adjustment and Repair Information.* So, why review it? It is a most impressive reference work, stuffed with photographs, diagrams, identifying labels, instruction sheets put out by manufacturers, how to date a machine from internal clues, and stray facts to do with the machines shown. It is incredibly helpful for anyone interested in coin-op or stand-on person scales.

Because there is no text, one might deduce that this work is impersonal, but every page shouts the enthusiasm of the Bernings, and their economy of style just leaves more room for more facts! One learns so much just studying the diagrams. Did you know that a Watling Tom Thumb Fortune-telling scale has 87 parts? Imagine trying to restore one to full working order! Read the instructions to go with the diagram and feel one with the engineer as you read the fourteen tips, such as *Be sure to have plenty of oil in the pump. Possibly it's hot there and you're not using heavy enough oil.* See some fortune cards and smile at the naiveté of the person on the machine! *Are My Ideas Sound? They're Brilliant But Not Practical.* Or *Will I be an Old Maid? No, you'll be a Batchelor-Girl.* [sic]

Perhaps this leaflet should not be requested by mere collectors, as Bill and Jan must make a profit in their unusual business, but it is difficult not to tell every ISASC member to get a copy. D F C-H

Review

Scales, a collector's guide, with price guide, by Bill and Jan Berning, published by Schiffer, 1999, price $29.95 plus packing and postage. Softback, pp 160.

There is little to say about this book other than buy it! It is a delightful, lush paperback, measuring 210 x 280mm (EQM's size) and with lovely photographs reproduced on excellent-quality paper. Over 450 colour photographs of scales and scale collections form the main part of the book. Scales ranging from the seriously expensive ($4000.00) to the cheap toy ($10.00), from the huge (several feet) to the tiny (one inch), from the fully restored to the "as found".

The photographs are small, around 2 x 3ins in most cases, and placed three or four to the page, but they are deliciously clear, sharp and attractive. With each illustration is a brief description giving the manufacturer, or maker if hand-made, the size, any unusual features and, of great interest to the collector, the approximate 1999 price in dollars. These indications of price will be of great value as benchmarks for future use. They have been obtained from auction lists, shop prices and owners' estimates. But they come with a sensible warning from the authors that price variations will occur - by as much as 80% - depending upon the quality and the rarity of any particular scale.

After a short introduction explaining in an intimate and friendly manner the background to their own passion for collecting scales, the main part of the 160-page book comprises 12 chapters covering Postal, Shop, Egg, Grain, Dairy, Gold, Coin, Gem, Scientific, Personal, Household, Toy, Miniature and Miscellaneous scales! Further, there are chapters on Building your Collection and Expanding your Collection.

Two minor criticisms: No dates are associated with the scales, and there is no index to the book. But these really do not detract from the pleasure of looking and handling and learning from this most attractive and useful book.

P HOLROYD

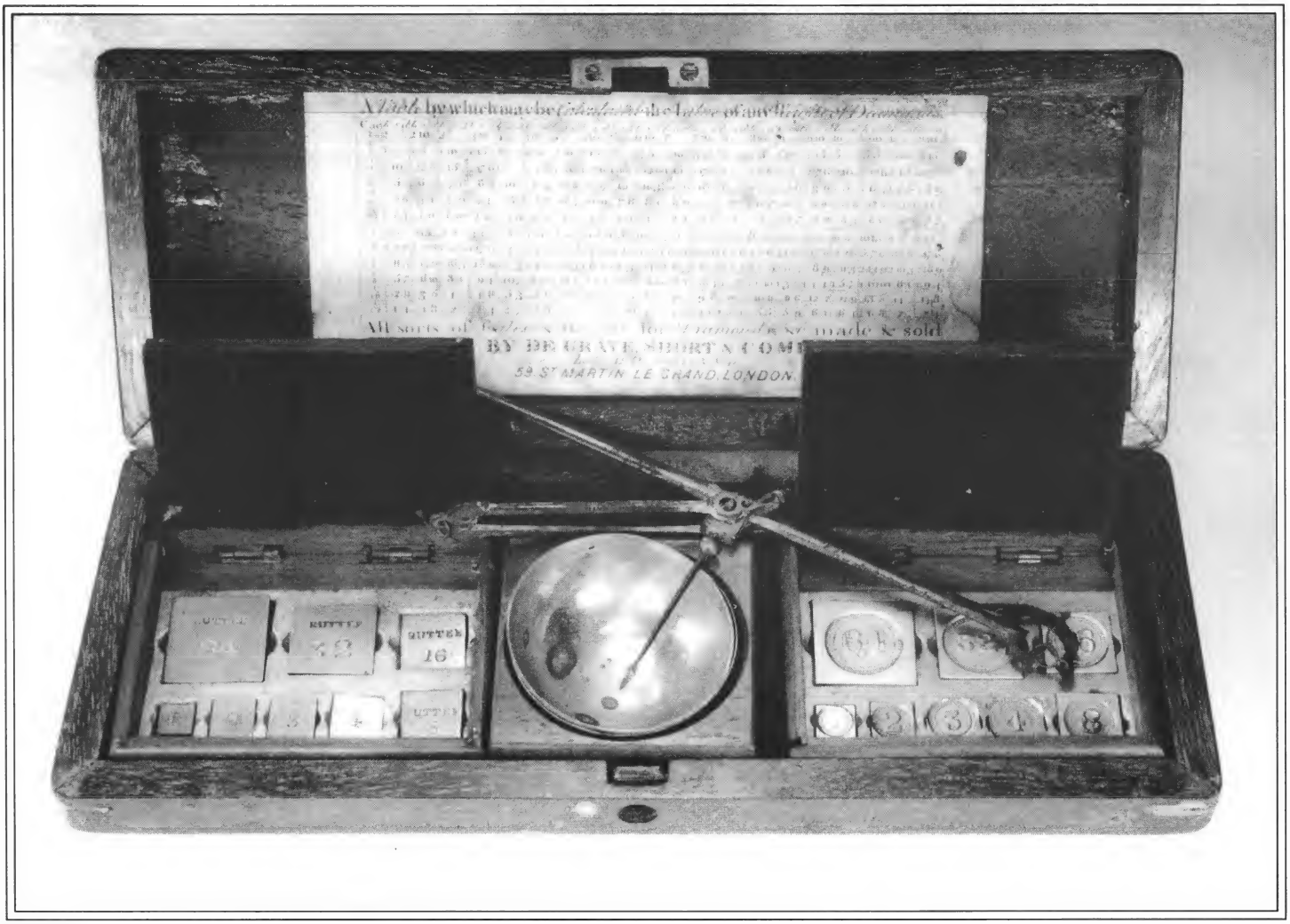
ISASC

EQUILIBRIUM®

QUARTERLY MAGAZINE OF THE INTERNATIONAL SOCIETY OF ANTIQUE SCALE COLLECTORS

1999—ISSUE NO. 4

PAGES 2393-2420



Cover Picture

This diamond scale was made in the late nineteenth century by DeGrave, Short & Company for use in India or the East Indies. It is the only example known of such a box containing the normal British carat weights, and, additionally, a set of Ruttee weights. The label states at the top, *'A Table* by which may be *Calculated* the *Nature* of any *Weight* of *Diamonds'*, followed by the chart for calculating the value in pounds, shillings and pence, of carats only, [not for ruttees]. At the bottom of the label it states 'All sorts of *Scales & Weights* for *Diamonds* &c. made & sold BY DE GRAVE, SHORT & COMPANY, *(Late M De Grave & Son), 59 S^{T} MARTIN LE GRAND, LONDON'*.

According to Kisch in *Scales & Weights*, one ruttee for weighing gold was 0.187gm in Bengal. But, as with all units of weight in India, that is not the whole story. In Bombay, Surat and elsewhere, one ruttee was $^{1}/_{96}$ of a tola, and weighed 0.13gm, whereas in Calcutta, one ruttee was $^{1}/_{72}$ of a tola gold, $^{1}/_{84}$ of a tola silver and weighed 0.14gm. *Chambers Cyclopaedia* of 1753 defined a ruttee as 88% of a carat. The word Ruttee was spelt in various ways, including Retty, Packaretty, Pakkaretty, Rati, Rotti or Rootee, all being the Hindi word for the seeds of *Abrus precatorius*, called in the West, the carat.

Because of the local variations, we might be tempted to think that their weighing systems were primitive, but that would be fallacious. While the English were still only weighing to an accuracy of about a quarter of a grain, Hakluyt wrote in his *Natural and Moral History of the Indies*, published in 1590, of the Indians weighing gold, *Their ballaunce and weights are so delicate and their grains so small, as they cannot take them up with the hand, but with a small pair of pincers; and this triall they make by candlelight, so that no ayre moove the ballance. For of this little the price of the whole barre dependeth.*

ISASC

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Collecting European Coin-Scales

BY Ch J VALENT

From the late Middle Ages till the 19th century coin-scales were made. A painting by Marinus van Reymerswaele (1493-1567) shows a big flat coin-scale box. Unfortunately, none of these boxes have survived, either in private collections or in museums. The boxes were necessary because of the ease by which loose coin-weights were lost.

In those days there were many different gold and silver coins, particularly from West-European countries, in circulation. The coins were, especially for bigger money transactions, checked by their mass. Those people who used these boxes were the forerunners of the present-day bankers, moneychangers and tax collectors, and, additionally, were the more important merchants dealing in textiles, corn, etc.

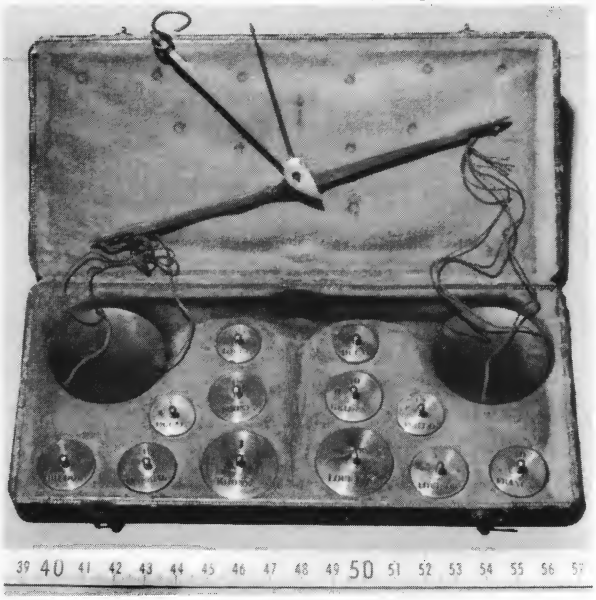


Fig. 1. Anonymous coin-scale from Berlin, Germany, mid-19th century. Leather-covered box lined with red fabric and edged with gold braid. Flat round weights with small knobs, each stamped with the coin's name. 6½ins (160mm) beam of brass with flattened double-hole ends. Photo R Holtman

The coin-weights were stored in a wooden or metal box, every weight getting a separate compartment. Mostly, the wooden boxes were made of fruitwood. There are nice boxes lined with leather, cloth or paper. In the box there is a small scale and there is often a label glued in the lid with illustrations of the coin-weights present in the box.

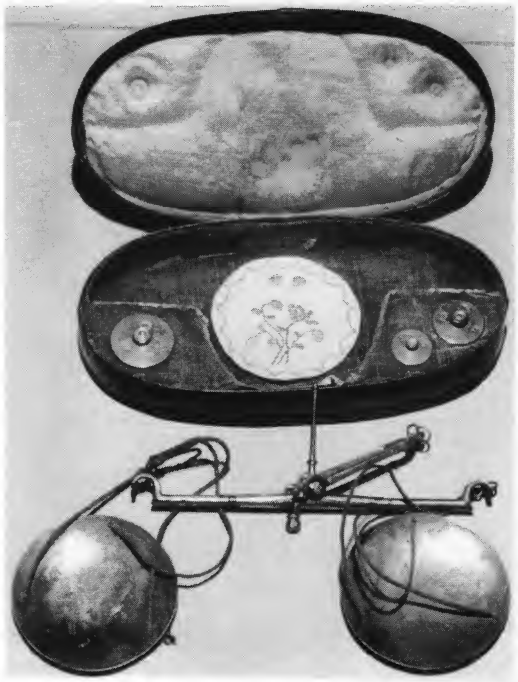


Fig. 2. Anonymous coin-scale from England, c.1780. Tin, black-japanned box with pink silk in the lid, and red hand-cut velvet in the base. Typical English swan-neck ends on the 4ins (90mm) iron beam. Brass pans. Flat round weights with small knobs in shaped wooden blocks. Guinea indicated by "5 8"; half-guinea by "2 16"; and quarter guinea by "1 8". Photo R Holtman

Usually there is a sliding-lid under which the "azen" [grain-weights] are stored. "Azen" are sheet-weights to determine the difference when a coin was too light and the user had to pay one or two pennies extra.

One does not often see weights for silver coins. For silver coins, it made sense only to weigh the bigger ones like the Spanish eight Reales. But there are special boxes made with weights specifically for weighing silver coins, such as the one made by Guilliam de Neve in Amsterdam in the 17th century, shown on the cover of Meten & Wegen 88.

The earliest surviving boxes date from the 16th century. In the 18th century the use of coin-weights declined and they reduced production. There were fewer distinct coins in circulation and, using modern manufacturing methods, an ornamental border was incorporated so that clipping the coins was obvious. The Berlin boxes were more-or-less the last coin-scales to be made (fig. 1).

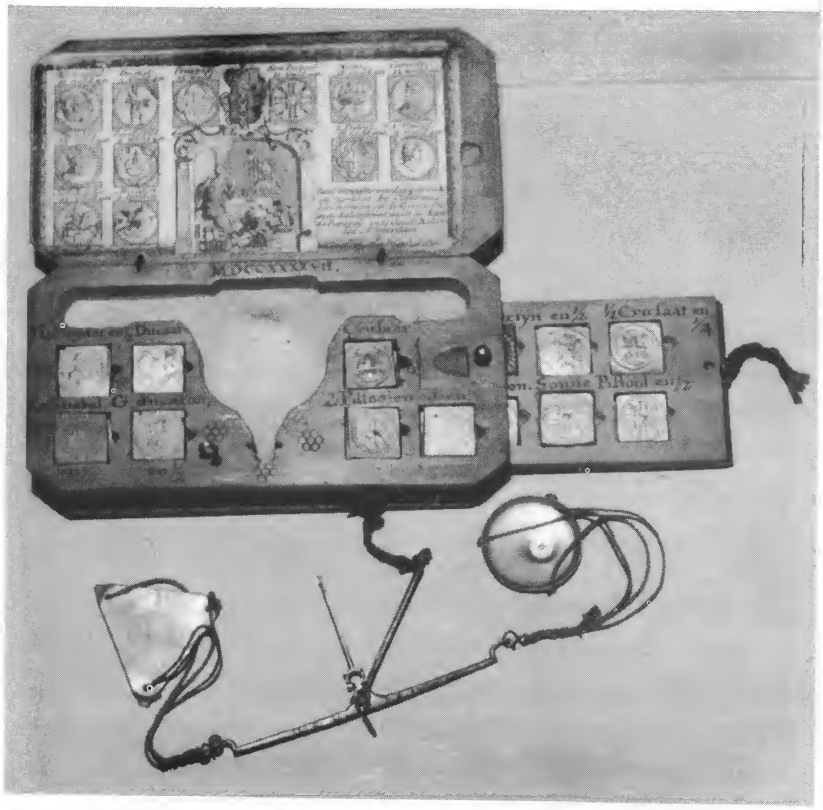


Fig. 3. ➢➢ Coin-scale by Johannes Linderman op de Beurs en in de Kalverstraat, naast de Kerk de Papegaij, in de Goude Balans, Tot Amsterdam [Netherlands], 1747. Label in the lid printed, then hand-coloured with red, yellow and blue. Drawer with extra weights underneath. Compartment for "azen". The weights each bear a stylish portrait of the coin; the correct hole being indicated by a hand-written label on the wood. The pointer has a decorative hole at the base surrounded by four pips. The swan-neck beam has flattened ends, a clear difference from English swan-necks. The brass pans are silvered, the triangular one bearing no markings, and the round one being heavily punched by Jacob l'Admiral Jun.

Collecting coin-scales usually starts as soon as one acquires the first box, as the owner gets interested and wants to know more. There are numismatists who get involved with coin-weights because they find them amongst their coins. They too get interested in coin-scales and coin-weight boxes. This way, several became members of the Gewichten en Maten Verzamelaars Vereniging [the Netherlands Weight- and Measures-Collectors Society].

Once fascinated by these boxes, it might be an ambition to buy examples from every country, but after some time, this seems an impossible achievement! In the past, there were, in Germany, specialist auctions of coin-weights and boxes. How can they be obtained now? This costs quite a lot of money, but do not be discouraged. There are still nice boxes for sale, especially in England, for a reasonable price, such as the metal black-japanned boxes, from the 1750-1825 period, (fig. 2).

As a Dutchman, preference might be given to collecting boxes from the Netherlands, (fig. 3). Because, as a small country, we did business with so many other countries, a lot of coin-scale boxes were made. Unfortunately, when they contain the

Fig. 4. ≺≺ Coin-scale by J F Wolschot, Woonende over de braderij, Straet bij her vlees huijs [Antwerp in Belgium], 1750. Label in the lid corrected by hand to give new address. Compartment for "azen". The weights bear a stylish portrait of the relevant coins. Photo R Holtman

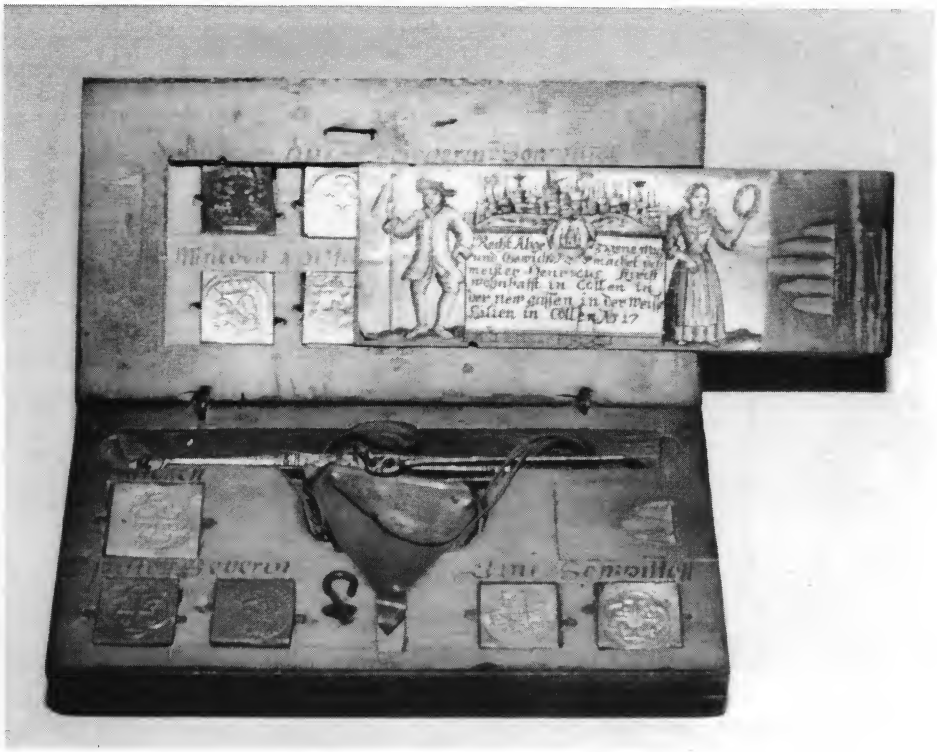


Fig. 5. ➢➢ Coin-scale by Henricus Kirch, wöhnhafft in Cöllen in der new neu gassen in der Weisse Lilien in Cöllen, Aõ 17.. [At this address in 1749.] Label on the sliding inner lid. Compartment for "azen". Weights bear the portrait of the relevant coin, and have the correct socket indicated by hand-writing on the wood. Simple finish.
Photo R Holtman

original weights, preferably with the same maker's mark and a reasonably undamaged label in the lid, they are expensive. Try as much as possible to buy complete boxes; to complete them subsequently is difficult. Spare coin-weights nowadays found with metal detectors, are, most of the time, of too inferior a quality to match the weights kept always in their box. The majority of the offered boxes are "completed" with "wrong" weights of a later date or from other countries.

Some countries where coin-scale boxes were made include:

North and South Netherlands

In the 16th century production was concentrated in Antwerp (fig. 4) and Namen, and later, especially in Amsterdam. There were also makers in Rotterdam and The Hague.

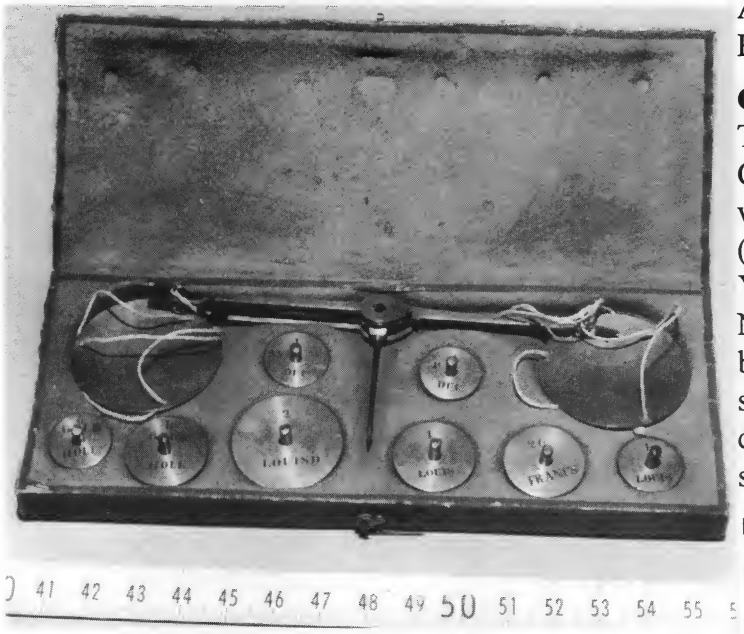
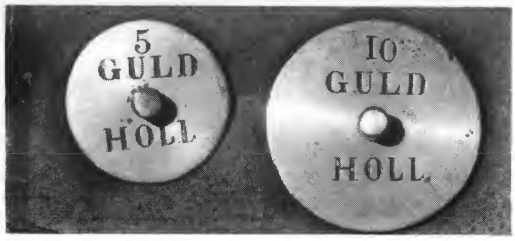


Fig. 6. ∧∧ Anonymous coin-scale from Berlin [Germany], mid-19th century. Exterior covered with scarlet paper impressed with flower motifs, inside lined with chamois-leather. Brass beam 4ins (100mm) long with double-hole ends. Flat round weights with knobs, stamped with the name of the relevant coin. Photo R Holtman

Germany

The best known boxes were made in Cologne (fig. 5). Different styles of boxes were made in the Bergisches Land (Herzogtum Berg and Grafschaft Mark). Yet another style was developed in Nuremberg and Berlin (fig. 6) where the boxes were normally anonymous. It is striking that the Dutch five and ten guilders were needed in Berlin, as demonstrated by coin-weights in fig. 6 & 7.

Fig. 7. ∀∀ Dutch coins of 5 and 10 guilders.



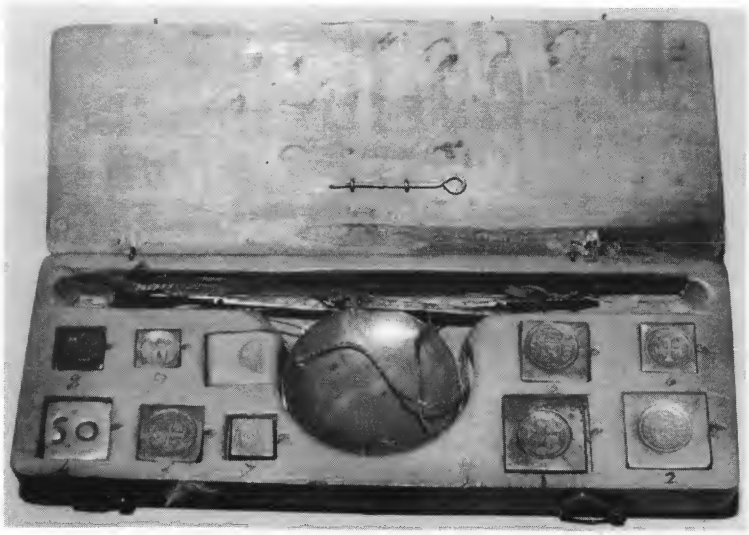


Fig. 8. ≺≺ Coin-scale by Jacques Michaud En Quatre chapeaux, Lyon [France], 1681 [?]. Name hand-written in ink on the inner lid, a characteristic of Lyon scales. Box 7ins (180mm) across box. Simple iron scale with double-hole ends. The "azen" [grain] locker's lid slides into the pan-recess, thus reducing the chances of losing the lid. Poker retained in the lid, to lever out firmly-held weights. Michaud's work is very rare, but he is mentioned by C Martin & M Campagnolo thus; Michaud was born in 1626, freed in 1670-71, and was a citizen in 1680. In 1676 and 1680 he was recorded as living at rue Mercière à St-Michel à Lyon. His mark was IM crowned.
Photo R Holtman

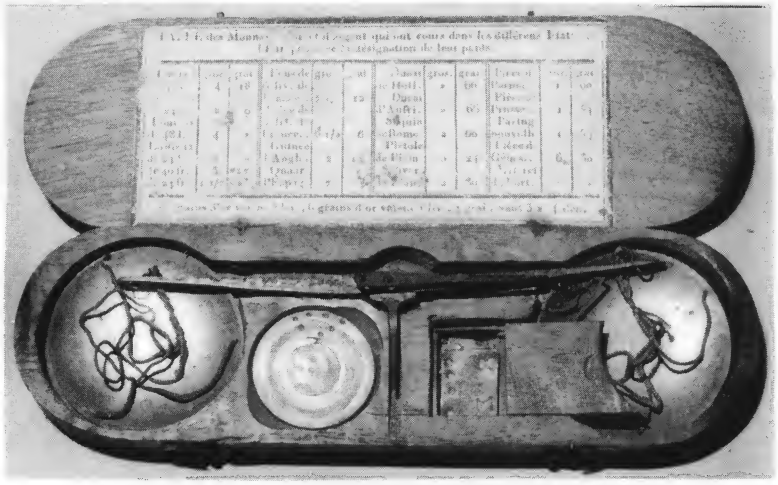


Fig. 9. ≻≻ Anonymous coin-scale from France, c.1780. In the lid is a table that indicates the mass of the coins in "gros" and "grains". Simple iron beam 4¾ins (120mm) long with double-hole ends. The nesting weights are punched with pellets to indicate the number of gros, so they are bullion weights not coin-weights. The grain-locker opens into the right-hand pan-recess, and has survived. Characteristic round-ended box used for these economical, popular scales.
Photo R Holtman

Fig. 10. ≺≺ Coin-scale from England, c.1640, with beam and pans replaced c.1680-1690. Probably made originally to take eleven coin-weights and a set of apothecary weights, each in a socket in the lid. A classic case of adaption by a later owner to his own needs, and thus having added interest for the historian. Outside of box shown below.
Photo R Holtman

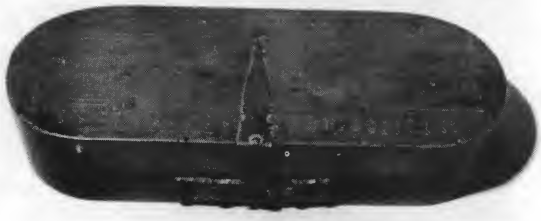


Fig. 11. ≻≻ Fruit-wood box 7¼ins (210mm) across, with brass push-button catch and a false push-button to match. Flat strap of brass across the top of the lid giving a slightly decorative finish to the catch-flap. Wood stamped with book-binders' stamps of crosses round the edge and bunches of flowers and scrolls in the centre of each panel.
Photo R Holtman

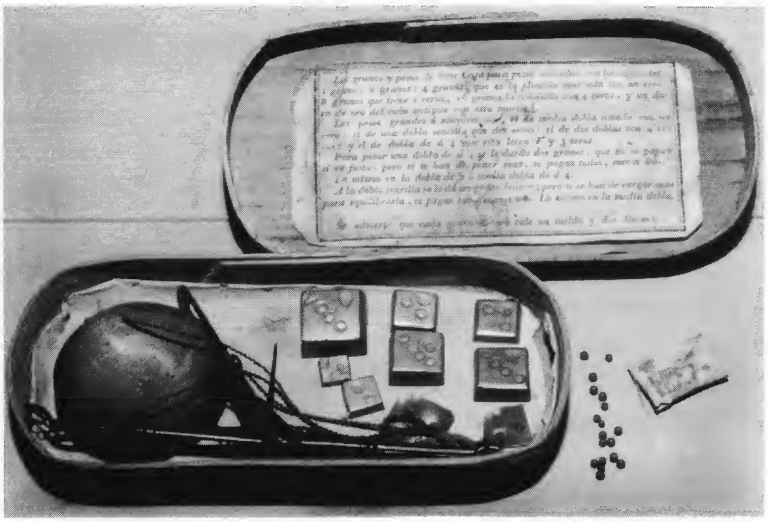


Fig. 12. ➢➢ Anonymous coin-scale from Spain, late 18th century. Box and lid made of bent-wood. A label explaining the relationship between granos and ceros, and the weighing of the silver eight reales (V000) down to one reale [dobla]. Beam 5ins (130mm) long, with swan-neck ends flattened at the extremities. Truncated pyramidal weights in ceros, and flat sheet weights in granos. The lead-shot is for precise weighing.

Photo R Holtman

Fig. 13. ⩙⩙ Coin-scale from Vienna [Austria], c.1800. The box covered with black leather and stamped with double-headed eagle and CZEHULA FERENCZ, and lined with rose-pink chamois-leather. Flat round weights with knobs, and stamped with the name of the relevant coins. Photo R Holtman

France

A great diversity of coin-scales were made in the best-known centres of Paris and Lyon (fig. 8), Bordeaux, Rheims and Limoges. Well-known, but cheaper, are the anonymous boxes with a simple scale, a set of nesting weights and in the lid a Table des Monnaies (fig. 9).

England

As mentioned before, they made metal japanned boxes, but also many wooden boxes of great variety. Most of the known makers were concentrated in London (figs. 10 & 11) and later also in Birmingham.

Italy

The best-known boxes are from Milan and Turin. From Turin came the large boxes with 33 coin-weights. The weights bear text which indicates the coin and its mass.

Spain and Portugal

Boxes came particularly from Madrid, Valencia, Barcelona and Lisbon (fig. 12). Some of them are very simply made of bentwood (in the stylistic fashion made famous by the Shakers).

Austria/Hungary

Viennese boxes had a special triangular form, lined with chamois-leather (fig. 13).

Switzerland

These mainly look like French boxes.

These are the best-known countries where coin-scale boxes were made, but if you think that it is impossible to collect boxes from every country, you might specialise in one particular country. For example: there are collectors of Dutch boxes of all designs made only in the Kalverstraat in Amsterdam; or only boxes from Rotterdam; or a well-known family like the Wolschots or the Lindermans. As you can see, there are numerous possibilities.

This article was first published in Meten & Wegen no. 93, March 1996, republished under the agreement to use each other's articles when the articles are of wide interest to our readers, and kindly translated by Jaap Visser on behalf of ISASC. Extra assistance was given by Ritzo Holtman.

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Notes & Queries

N & Q 142 — From A J CRAWFORTH

A knipwage for weighing silver coins has come onto the market. The brass steelyard is contained in a small black, papier-mâché cap-end case.

Reading Ritzo Holtman's article in EQM, 1897-1901, (which was immensely helpful), this example was made to weigh the same coins as no. 11 of the Table on page 1900, so was made, presumably, in the second half of the 17th century. As only one example of a knipwage for these coins was known previously, this must be a rare scale.

At first glance, the maker's mark appeared to be that of the orb, as illustrated below in the middle, but on closer examination, this example is definitely different. It was so neatly struck, and was so little rubbed, that it could clearly be identified as a concave-based spade form above a fleur-de-lis (fig. 2, left). Is there more than one maker of knipwage, or one maker with several punches?

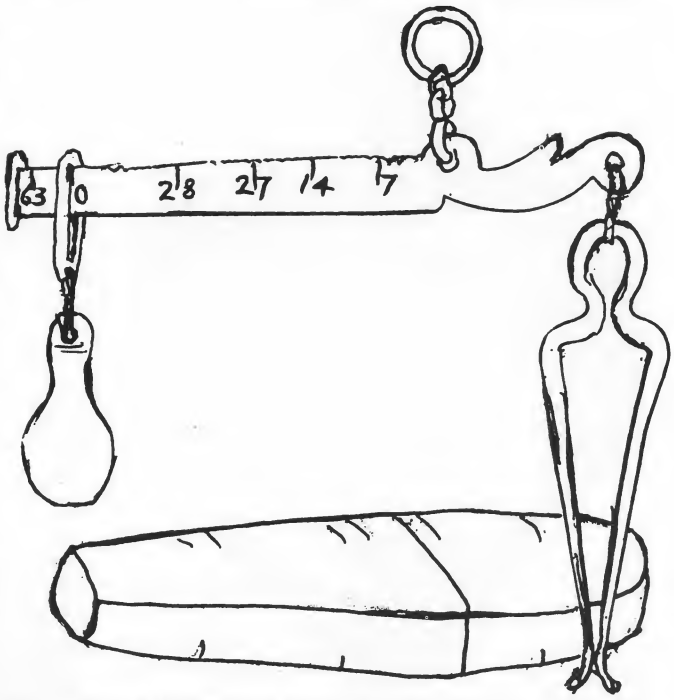


Fig. 1. AA A Netherlands knipwage with has a cap-end case. Notched for 6, 12, 24, 31, 48 and 60 on the front and 7, 14, 25, 28, 50 and 63 [stuivers] on the reverse. See p. 2402 for international values. Rough sketch A J Crawforth

The steelyard is of the single-point flourish design, and has a coin-clip virtually identical to the one shown on page 1897. The case features an impressed mark comprising three five-petalled flowers within a crescent (fig. 3). This could be a case-maker's mark and not related specifically to any scale-maker.

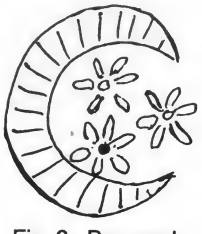


Fig. 3. Box mark.

Have any additional examples of these rare knipwages come to light since Holtman wrote his article in 1995? Are there more than three marks known?

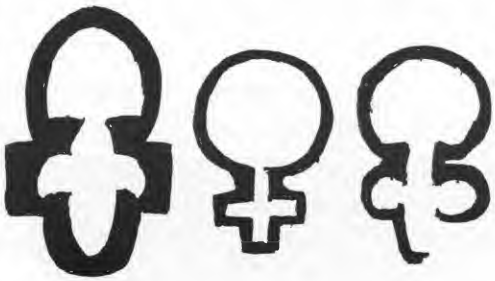


Fig. 2. AA Left: The mark on the latest find; middle: the mark on nos. 10 & 12 and right: the mark on no. 2 of Holtman's Table.

More on Weighing Silver Coins

As stated by Ch J Valent in his article on coin-scales, p 2395, it was seldom necessary to weigh silver coins, as the value of any lost silver was not of any great monetary significance. Most silver coins were taken at face-value.

However, there were some exceptions. Paul and Bente Withers on pages 82 and 83 of their definitive book *British Coin Weights* (reviewed in EQM, 1793-1796), discuss the need for weights for silver coins during the reign of Charles I (1625-1649) in England. They point out that the percentage of silver coins rose from 1% to 95%, as gold coins were sent out of England to pay debts on the Continent. Culling became immensely profitable because the silver coins varied immensely in weight when they left the Mint; consequently heavier coins were sold as bullion. Siege money was unfamiliar to many in the population and had to be weighed to ascertain its value. For all these reasons, weights for silver coins were in demand.

See *British Coin Weights*, page 114, for a further comment on the weights for silver coins, and page 132 for examples like those shown in the last EQM, 2391. The use of silver coins was widespread in the British colonies between about 1700 and 1850. John Kirk made beautiful weights in 1749 with the bust of Elizabeth I on the obverse, although she had died in 1603! Presumably the colonies were still using her 10/-, 5/- and 2/6 coins as currency, and needed to check their weights as they were so worn. [Editor;- the use of Withers' numbering system for identification of British coin weights is now the convention used by collectors and auction-houses, because the Withers' system is so accurate, comprehensive and precise. Note their use in EQM, 2390 and 2391. In future, "Withers no. xxx" will be used without further explanation.]

13 British colonies, the states that became the USA, used dollars extensively, and continued to do so

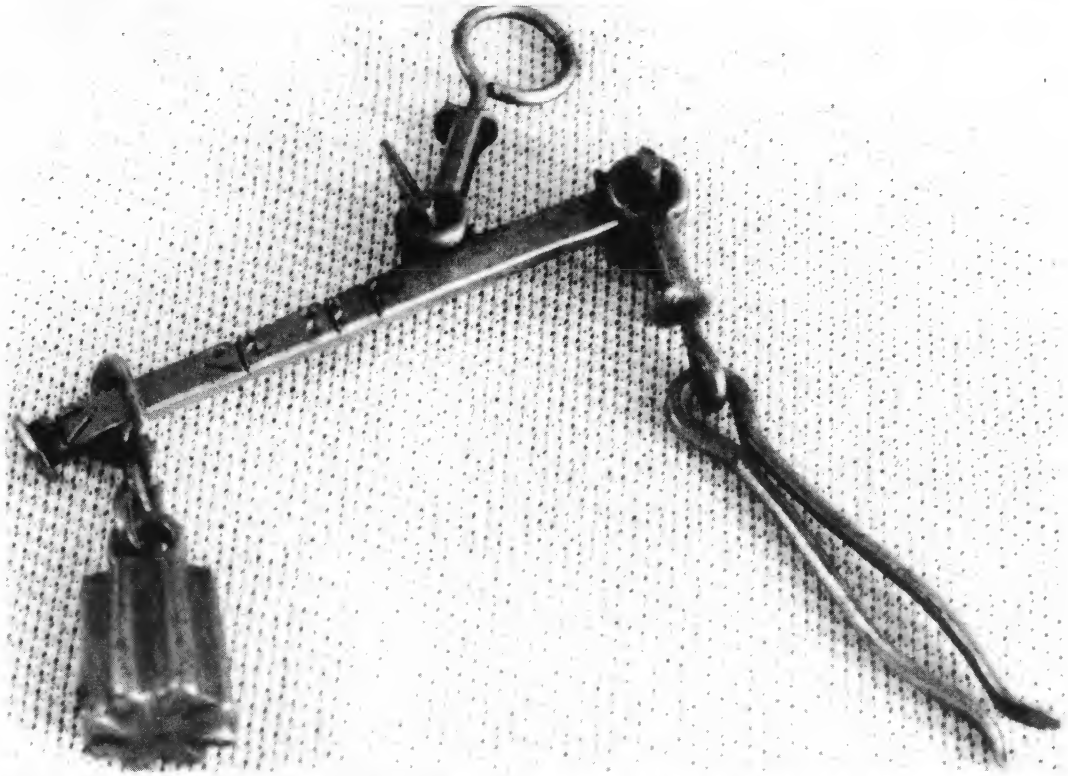


Fig. 1. ^^ Tiny steelyard only 3 ins (75mm) long, very similar to the coin-weighing ones shown in EQM, 2391. Made of steel. Probably Spanish. Paul Reidinger Collection

after they became independent and the British needed to check those dollars during the 19th century.

The Spanish (?) steelyards shown in the last issue of EQM are analogous to the Dutch steelyard discussed by Crawforth on p 2400. Another iron example of the Spanish type is shown in Fig. 2.

Fig. 2. ⩓⩓ Iron steelyard 2¾ins (58mm) long, with marks on the beam at 6.6. 13.1, 19 and 24.9gms, for the Spanish escudos (also called reales).
Collection R Holtman

Tests done by Ritzo Holtman, after buying it from an antique dealer and thus having no provenance for the steelyard, provide some answers. The notches are set at 6.6gm, 13.1gm, 19gm and 24.9gm, as nearly as can be ascertained. This suggests that the steelyard was to weigh 2 reales, 4 reales, an unknown coin and 8 reales. This evidence is in line with the assumptions made by other owners, that their iron steelyards *were* Spanish and for weighing reales, but, as reales were used so widely, is it correct to believe that they were made in Spain? Has any contradictory evidence been found? Both Holtman and Crawforth-Hitchins are keen to publish any evidence that clarifies the origin and dates of these rare steelyards.

US silver dollars must have been taken in payment by banks in many countries, so bullion weights for US dollars were used in many countries. The ones in fig. 3 are said to be British and made by Benjamin Payne because they are stamped BP on the reverse. There is no other evidence that Payne ever stamped his coin-weights, although many of his coin-weights have survived which do not have his initials.

Fig. 3. ⩓⩓ US Dollar bullion weights. BP on the reverse.
Collection G M M Houben

Contemporary Comment, 1720

This comment by Isaac Newton to the Treasury, 12th April 1720, gives a hint of the horrendous problems that any money-changer encountered. The spelling and punctuation are his own!

Taken from Rupert Hall, A & Tilling, L, (ed) *The Correspondence of Isaac Newton, Vol. VII, 1718-1727*, CUP, Cambridge, 1977, ISBN 0 521 08722 8.

I should report the value of Imperial Dollars both intrinsecally & by way of Exchange with Sweden: I humbly represent that the specie Rix dollars are coined of several values by several Princes of the Empire from 4s 4d to 4s 8d. But in Books of Exchange the Rix dollar is valued at 48 schellings Lubs of Hamburgh, at 48 styvers of Antwerp, at 50 styvers of Amsterdam & at 4s 6d English. There is also a Common Dollar of the Empire in respect of wch the Gulde or Guilder is usually marked $^{2}/_{3}$ to signify that is two thirds of this Dollar. The Gulde is 24 Marien grosch the Common Dollar 36 Marien Grosch & the Rix dollar two Guilden, so that the common Dollar is three quarters of the Rix Dollar. The difficulty is to know whether by the Imperial Dollar be meant the Common Dollar of the Empire or the Rix Dollar.....

Salt Steelyard

BY E COHN

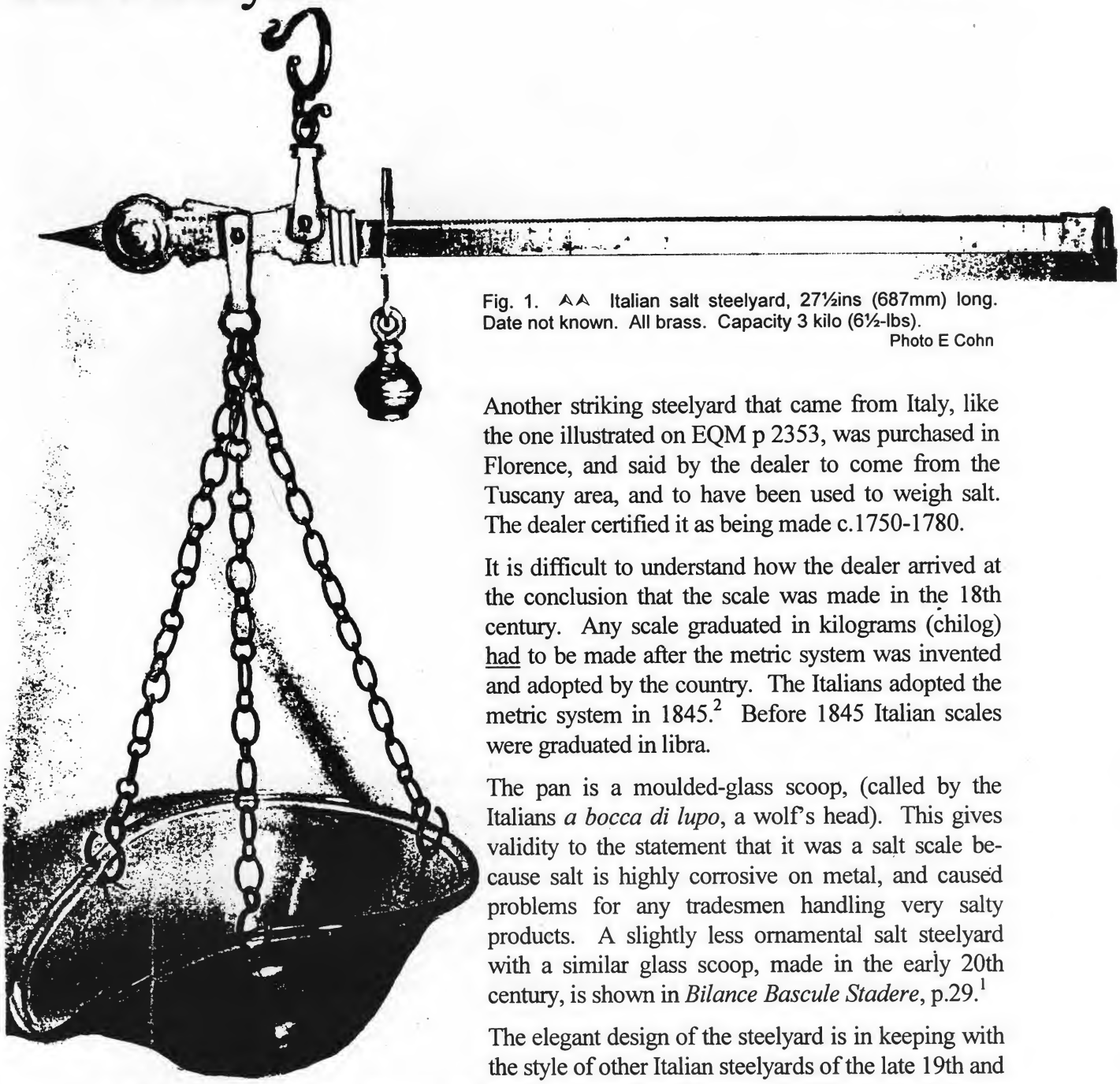


Fig. 1. AA Italian salt steelyard, 27½ins (687mm) long. Date not known. All brass. Capacity 3 kilo (6½-lbs).
Photo E Cohn

Another striking steelyard that came from Italy, like the one illustrated on EQM p 2353, was purchased in Florence, and said by the dealer to come from the Tuscany area, and to have been used to weigh salt. The dealer certified it as being made c.1750-1780.

It is difficult to understand how the dealer arrived at the conclusion that the scale was made in the 18th century. Any scale graduated in kilograms (chilog) had to be made after the metric system was invented and adopted by the country. The Italians adopted the metric system in 1845.[2] Before 1845 Italian scales were graduated in libra.

The pan is a moulded-glass scoop, (called by the Italians *a bocca di lupo*, a wolf's head). This gives validity to the statement that it was a salt scale because salt is highly corrosive on metal, and caused problems for any tradesmen handling very salty products. A slightly less ornamental salt steelyard with a similar glass scoop, made in the early 20th century, is shown in *Bilance Bascule Stadere*, p.29.[1]

The elegant design of the steelyard is in keeping with the style of other Italian steelyards of the late 19th and early 20th century, as clearly demonstrated by the collection of the Museo della Bilancia a Campogalliano.[3] Long after the other European nations had reduced their steelyard designs to the boringly plain, the Italians continued to produce varied ornamental designs with wonderful flourishes and details that make their steelyards beautiful.

They enjoyed using a combination of steel and brass, often making the blade of polished steel, and all the other parts from a particularly vivid yellow brass. Even in the 20th century, the Italians still made their hooks of gracefully curved metal with little flourishes at the end, a most attractive feature.

Fig. 2. ⩙⩙ The blade showing inspectors' stamps. The P probably is the abbreviation for its being Portable. Chilog is the Italian for kilogram. Note the very handsome boss balancing the mass of the blade.

Fig. 3. ➢➢ The top of the hook of the loose poise, showing the inspectors' stamps and the iron bearing.

Not only did the Italians make beautiful steelyards, but they also used steelyards extensively in trade, unlike some other European countries, such as Germany, where steelyards were scarcely used at all for trade.

Notes and References

1. Luppi, G & Bini, M, *Bilance Bascule Stadere*, pub. Bulino, Modena, 1987.
2 Kisch, B, *Scales and Weights*, Yale University, New Haven & London, 1965, Library of Congress no. 65-12545, p. 21.
3. Gilbertoni, R, Melodi, A & Luppi, G, *Il Museo della Bilancia a Campogalliano*, pub Electa, Milano, 1995

Postal Rates in the Confederacy

BY J R KATZ

An enquiry was recently submitted to ISASC: *During the Civil War, did the Confederacy have their own postal rate system, and if so, were their Postmasters issued scales accordingly?*

With respect to the establishment of separate rates, the Confederacy (1861-1865) did in fact have their own postal rates. The Confederacy effected a rate of 5 cents per ounce for letters sent a distance under 500 miles, and for letters sent over 500 miles, 10 cents per ounce prevailed. Effective from July 1st, 1862, the rate became 10 cents per ounce regardless of distance, but drop letters (mail serviced by the same post office; local mail in essence) were 2 cents per ounce.

As far as Postmasters being issued with scales accordingly, I believe this to be a non-issue. I know of no US scale made or in use at that time, which had postal rates printed or inscribed on the scale itself; they merely had weight graduations in ounces. The scales that come to mind are the two counter-top steelyard varieties made by Howard & Davis (EQM p 2368) and by Fairbanks (see next article) both suppliers to the Post Office in the early days of our postal system. The beams were graduated to 9 ounces by ¼ ounce increments, with no annotation of cost per ounce. Both these scales would probably have been in use at the outbreak and during the Civil War, although, by then, Fairbanks had won the contract from Howard & Davis to supply the Post Office with their scales. To the best of my knowledge and research, there is no evidence that the Confederacy had built for them any scales; I assume they used what existed at the start of the war.

Does anyone have evidence of special Confederate scales?

With thanks to the Historian, US·Postal Service, Washington, DC.

DeGrave Short & Fanner Exported

Reply from S CAMILLERI

As a reply to Andrew Crawforth's enquiry, EQM, p 2354, I would suggest the following:

Some rare folders made in England were only for exportation to foreign countries. For instance, W & T Avery folders for weighing Spanish Doubloons carried a label written in the Spanish language, to be used, obviously, in Spain and not in England.

See also M A Crawforth's *Weighing Coins*, page 100, in which he stated ...*One example had a label in Spanish which the dealer said he had removed and destroyed because it was inappropriate to a 'sovereign balance'. Unfortunately the balance was not what he thought it was, having been made for the Spanish doubloon and half-doubloon.*

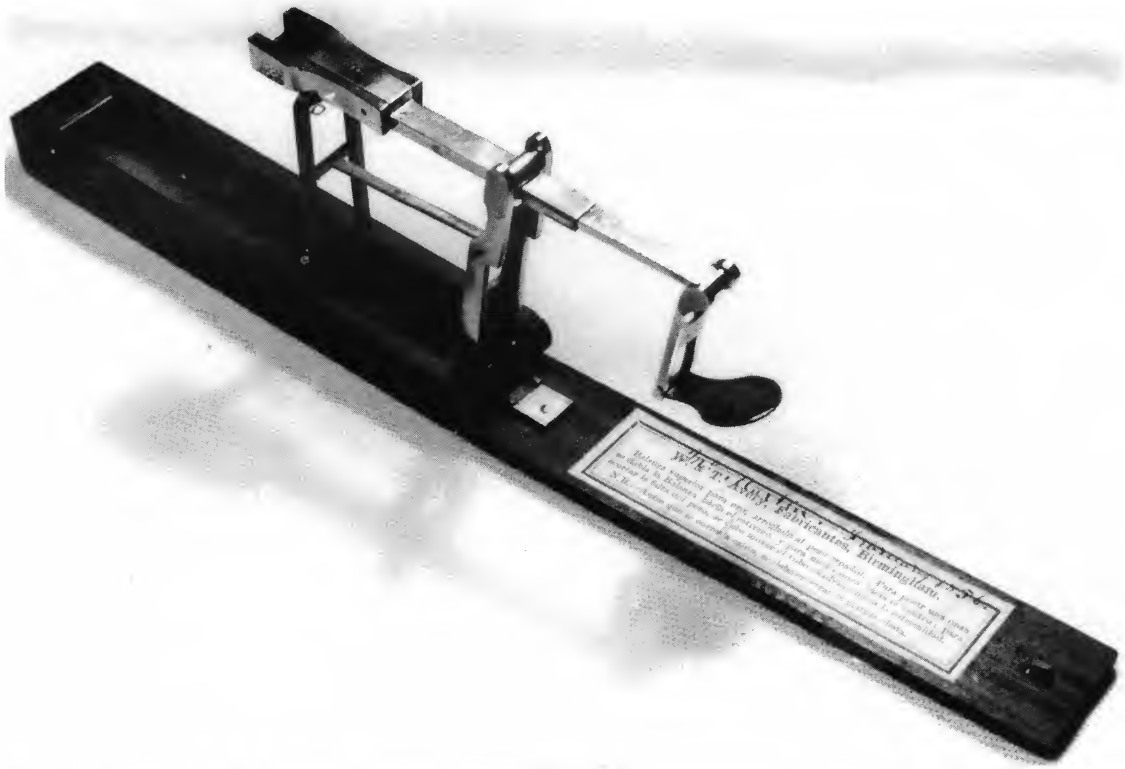


Fig. 1. AA W & T Avery folder for doubloon and half-doubloon. Seen in isolation, it looks unexceptional, but when put beside a standard folder, its great bulk becomes obvious. The pillars are only 10% larger than for a sovereign folder, but the sheet metal from which they were cut was twice as thick as normal. The plate on which the coin rested is twice the area of a normal plate and the poise is about twice as deep and 20% longer, because a doubloon is three times as heavy as a sovereign. Just seeing the chunky box from a distance, once the collector is familiar with doubloon folders, is a major clue. Photo M A Crawforth

Similarly, The DeGrave Short & Fanner folder was intended to be used in Portugal during the working time of DeGrave Short & Fanner, i.e., after 1845, although it was not needed by that time in England. The firm was later absorbed by Avery.

Incidentally, the discrepancy graduations on the beam indicate lost grains of gold and not lost English pennies. [Editor:- Apologies to our members. This proves the need to check carefully when the graduations give no indication of what units they represent.]

We thank Guido Zavattoni for suggesting the same solution to this enigma.

W & T Avery, Fabricantes, Birmingham.

Balanza superior para oro, arreglado al peso español. Para pesar una onza se dobla la Balanza hàcîa el estremo, y para media onza hàcîa el centro; para acertar la falta del peso, se debe mover el tubo cuadrado hàcîa la estremidad.

N.B. Antes que se currasla cajita, se debe encurrar la platilla chata.

Fig. 2. ⩓⩓ Label from folder shown in fig. 1. W & T Avery folding gold balance made 1855/6, to weigh the doubloon and half-doubloon [eight reales and four reales]. The label is over-written by hand *M Marthe. February 1856*. The poise is stamped, in minute sans-serif letters, AVERY. Avery offered these folders to weigh Doubloons until at least 1880, and to weigh Napoleons, Turkish Lira or Egyptian Lira and ½ Piastre until at least 1916, in addition to the standard sovereign-weighing versions which Avery sold from about 1830 until about 1916.

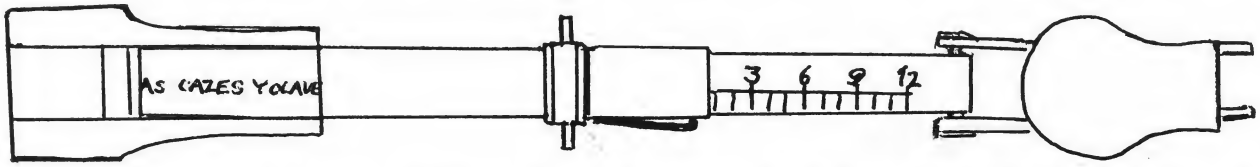


Fig. 3. ⩓⩓ AS CAZES Y OLAVE stamped on the poise of a folder identical to the Avery above, the same large size, also for weighing the doubloon. Presumably this Spanish company bought Avery folders with their name stamped on before export. A hand-written label in the lid is assumed to be the owner, DRABBLE BRO'S & CO. Many companies with British names made sherry for export to Britain. Was this one of them?

Weighing in India, 1865

Taken from *XIV Standards Commission*, Paper Delivered by The Warden of the Standards in 1869, p 13.

Although the British had attempted to regularise weighing in India in 1833, in practice, they confined their efforts to places where they had influence. In 1866 Col. Strachey said of the [British] Government seer and maund that *although their use was no doubt more general than that of any other type of weight, yet their use was very limited when set against the whole extent of India.* He reported that *since their introduction in 1833, no serious attempt had been made to bring them into use in the country at large, and could be said to be unknown out of the chief towns near which a large English society had grown up.*

C Gover reported in 1865 that he had upwards of 300 different rupees of various weights, all of which were either in circulation or have been during the last forty years, every one of these weights being the tola weight of some particular district or village. As regards the seer, he enumerated 266 places where the seer varied from 24 to 140 tolas. At 15 of these places, including Calcutta, a seer was 80 tolas; at Madras for Government purposes was 120 tolas. Gover said "*The seer is liable, according to the pernicious system hitherto prevalent, to vary in weight for every article sold, as well as for every market*".

Fig. 1. ⩔⩔ 1 Seer, R S K G I F AGRA. This iron weight could have been cast in one of the iron foundries in Agra, or it might have been cast by T & C Clark of Wolverhampton, in Britain.

The latter advertised in their catalogue of 1880, *T & C Clark & Co will, on orders for 100 sets and upwards, if required, cast the name of any customers on the 4-lb weight. Round Indian Weights of Registered Pattern* (that shown in this figure, registered in 1869) *in sets 2½ Seer to ¼ Chittack plugged with lead 2s..1d. or 1 Seer to ¼ Chittack 1s..3d. The ¼ Chittack is made in Brass.*

T & C Clark also advertised Indian Weights in the shape of iron ring weights, plugged with lead or copper 1 Maund to ½ Chittack. These were tall, tapering cylinders with dished tops and rings to lift by.

Photo L uit den Boogaard

Australian Pendulum Postal

BY V DENFORD

This pendulum postal scale is a unique part of the postal, social and economic history of Australia. From the writer's experience, it is the first example seen of a postal scale with Australian (New South Wales) postal rates. It is made of aluminium with a brass letter-clip and holder.

The obverse provides the advertising and the graduated divisions of 0 to 4oz by ½oz, with WILLIS PATENT JUNE 5th 1906 round the pivot of the holder, shown in fig. 1. The reverse shows the postal rates applicable in New South Wales during the period 1st March 1901 to 30th April 1911. (Uniform postal rates were to have been introduced at the time of the Federation of the Australian States and Territories in 1901. However, due to disparate rates in various States, uniform rates did not take effect until 1st May 1911.)

Joseph Taylor Coffill, the gentleman portrayed, was born in London, England, in 1841 of Huguenot descent. He migrated to Australia in 1863 and settled in Queensland, becoming a carrier along the coastal towns of Rockhampton and Townsville. Moving to Sydney in 1878 he established J T Coffill's Livery and Letting Stables. The funeral business was introduced in 1899. Joseph has been recognised in Queensland and New South Wales as a true pioneer of Australia.

This pendulum scale is one of a large number of advertising gifts introduced by Coffill & Co, Funeral Directors and Carriage and Drag Proprietors in the first decade of the 20th century. (A drag was a four-horse carriage.)

Joseph Coffill made two World trips in the early 1900s and it is believed that on these trips he arranged for the manufacture of a wide range of advertising gifts bearing the company's name. These included thimbles, cigar-cutters, bookmarks, lead pencils, pen-knives, key rings, and wax match holders, and, of course, this pendulum scale. Only one other example of this pendulum scale is known to exist, in the possession of a grandson in Sydney.

As the scales were made in New York, presumably Joseph Coffill visited New York during his trip round the world and ordered his personalised gifts. Joseph Taylor Coffill died in 1919, aged 78.

Fig. 1. ≺≺ Aluminium pendulum postal scale, made between 1906 and 1911. Graduated 0-4oz by ½oz. Round the portrait it states 'COFFILL & COMPANY Funeral Directors Carriage and Drag Proprietors Sydney and Suburbs TEL. 424 - 1160 ETC'. Round the pivot of the holder, it states 'WILLIS PATENT JUNE 5th 1906'. Note the unusual and elaborate clip.

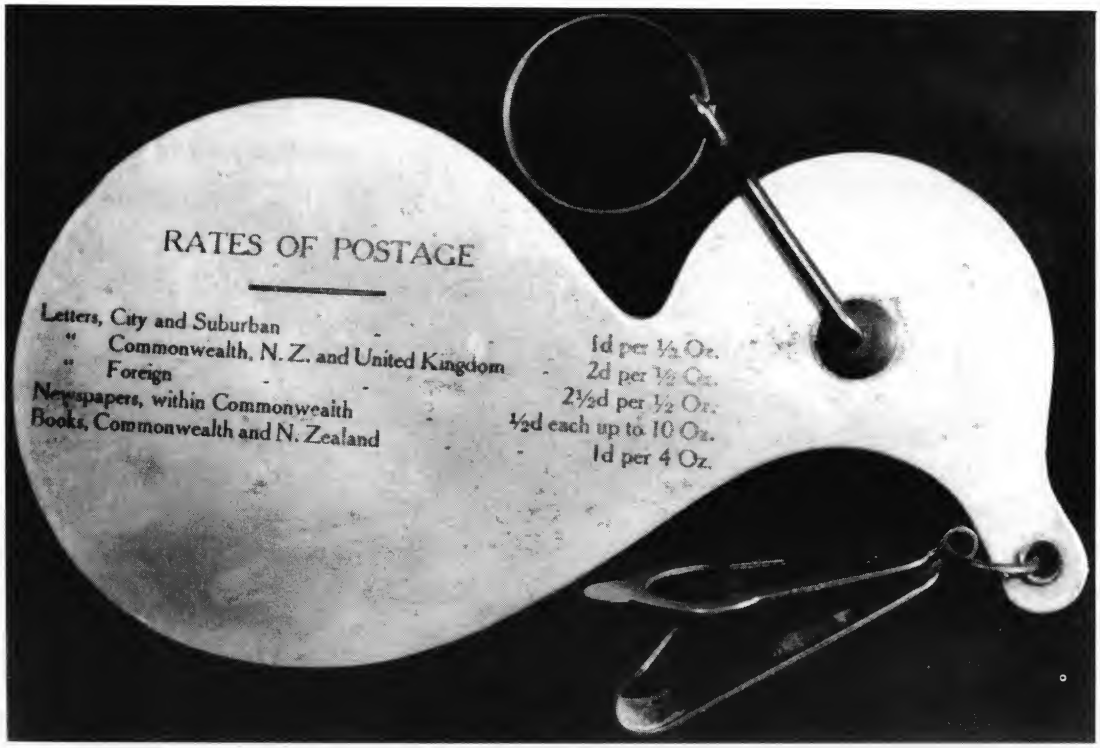


Fig. 2. ⩓⩓ Although it was only a cheap gift, the scale is surprisingly well made, with bearings to protect the aluminium from wear. The reverse states

RATES OF POSTAGE

Letters, City and Suburban	1d per ½oz
" Commonwealth, N.Z. and United Kingdom	2d per ½oz.
" Foreign	2½d per ½oz.
Newspapers, within Commonwealth	½d each up to 10oz.
Books, Commonwealth and N. Zealand	1d per 4oz.

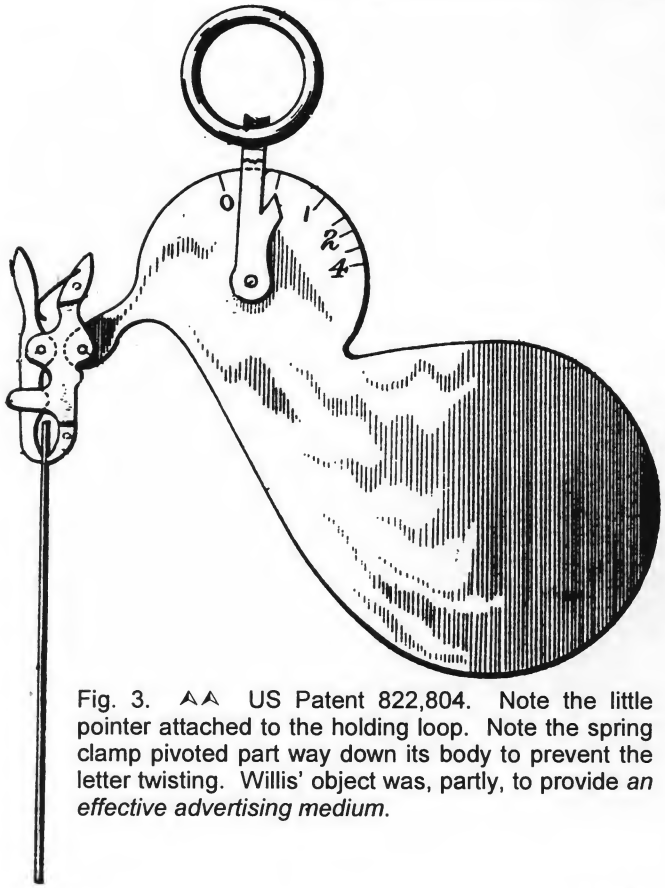


Fig. 3. ⩓⩓ US Patent 822,804. Note the little pointer attached to the holding loop. Note the spring clamp pivoted part way down its body to prevent the letter twisting. Willis' object was, partly, to provide *an effective advertising medium.*

The Willis Patent of June 5th 1906 enables us to date the scale between 1906 and 1911. The patent no. 822804 was taken out in America by Henry M Willis of East Williston, Nassau County, New York State, to make a letter scale that *will be quite accurate, simple in construction and cheap of production....preferably make it of aluminium inasmuch as this metal is light, strong, susceptible of manipulation for the purposes of the scale, and is suitable for the application of an advertisement, and its use as an advertising medium.* On the same day, June 5th, Willis took out a patent no. 822805, for a "Universal Indicator", a perpetual calendar. This suggests that he was a stationers' manufacturer and supplier.

Acknowledgements

I am indebted for information on Joseph T Coffill provided by his grandsons, Neville T Coffill and Joseph F Coffill. Can any American member can trace the Willis company?

Notes & Queries

N & Q 142 From H B CRAWFORD

I was given this Fairbanks Infallible Coin Scale (Fig. 1) together with the advertisement for the Infallible Coin Scale Co (Fig. 2).

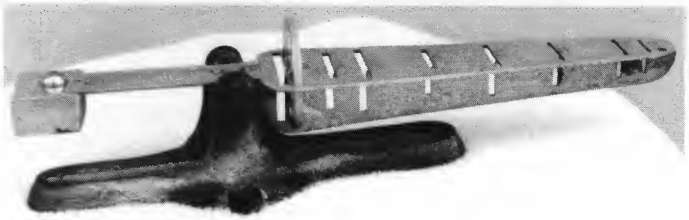


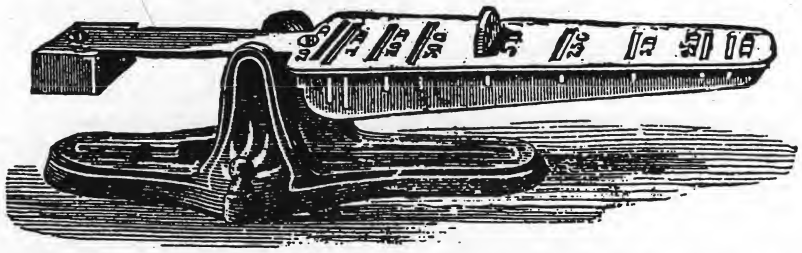
Fig. 1. ≺≺ FAIRBANKS is cast into the left side of the base and INFALLIBLE into the right side. A hole is drilled in the end of the beam to take the little round weight (now missing) that was stored at the front of the base. A silver dollar is shown in the correct slot.

Fig. 2. ∀∀ Note the dates December 21, 1881. Because the paper had deteriorated badly, the lower part has been replaced by a new rendering of the same words and format as the original. Unfortunately the proportions are slightly different, being longer than originally. The warrants given by Gilfillan and James are interesting in giving added confidence to the buyer, as does the five-year guarantee and the promise to redeem undetected counterfeits. The latter seems to be the only such promise given with a CCD.

THE INFALLIBLE COIN SCALE

Renders the Detection of Counterfeits Certain.

AGENTS WANTED EVERYWHERE.



EXCLUSIVE TERRITORY GIVEN.

Used by the United States Government in all the Departments as

THE STANDARD COIN SCALE.

With each Scale we give the full standard and least current weight of all gold coins.

TREASURY OF THE UNITED STATES
WASHINGTON, D.C., December 21, 1881

The Detector in question has been tested at this office, and found to be accurate in the detection of all counterfeit United States gold and silver coins.
JAS. GILFILLAN, Treasurer United States.

POST OFFICE DEPARTMENT
WASHINGTON, D.C., December 21, 1881.

I have examined the Infallible American Gold and Silver Coin Scale and Counterfeit Coin Detector carefully, and consider it accurate, durable, and cheap.
THOMAS L. JAMES, Postmaster-General.

☞ **Each Scale sent in a Handsome Box, Securely Packed.**

We send with each scale a printed guarantee for **FIVE YEARS**, and will redeem, at a nominal value, all counterfeit U.S. coin that it will not detect, thus affording

ABSOLUTE INSURANCE FROM COUNTERFEITS FOR $1 A YEAR

☞ **Sent by Registered Mail, or by Express, C.O.D., for $5.**

Insist on having one of our guarantee certificates, which we furnish with each Scale. Send Postal for testimonials. Make Money Orders or Drafts payable to order of

INFALLIBLE COIN SCALE CO., 267 Broadway, New York City.

The scale has on it "THE FAIRBANKS INFALLIBLE SCALE CO, BALTIMORE, MARYLAND". The advert has on it "INFALLIBLE COIN SCALE Co., 267 Broadway, New York City". How can anybody make a scale and put somebody else's name on it?

What was the little round weight for? Is it a test weight? Why is no hole for it shown in my advert?

N & Q 142 from the Editor

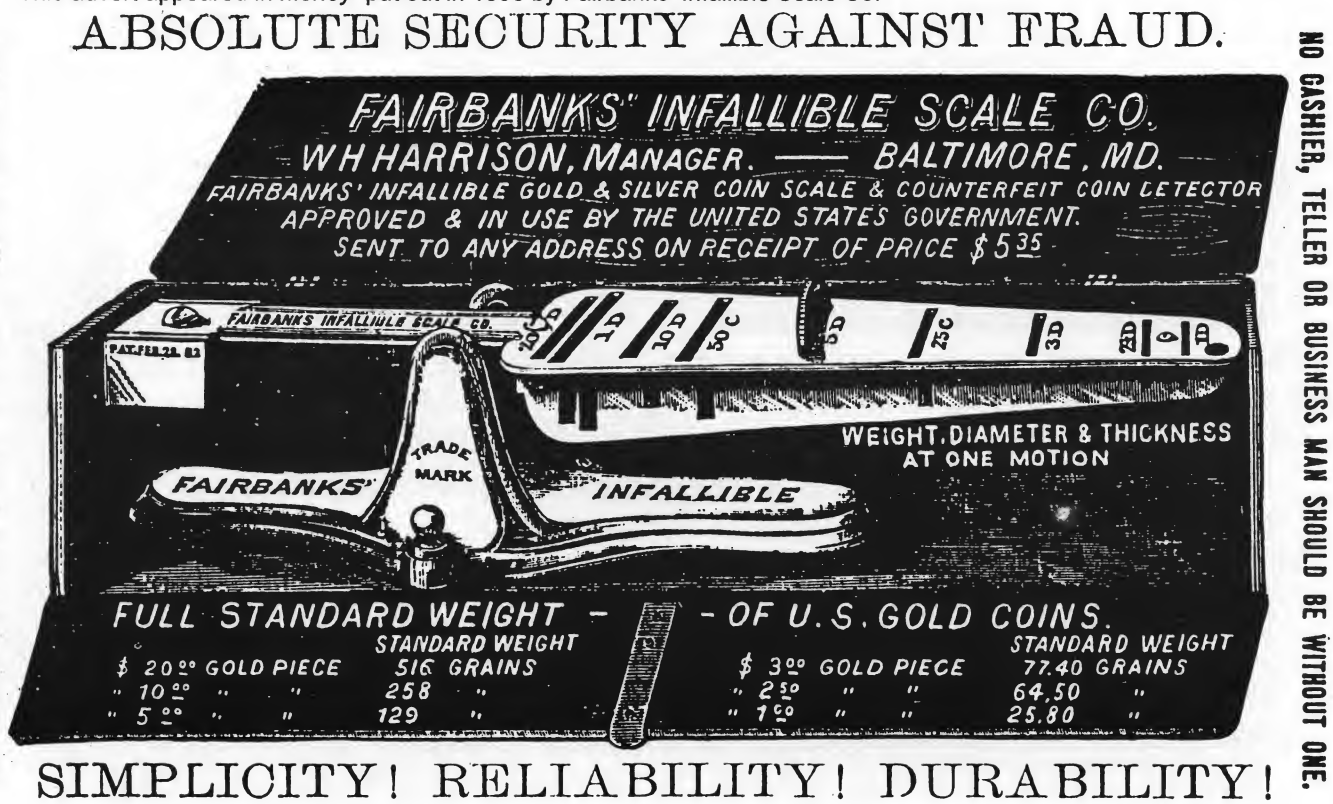
One question might be answered by the advert (Fig. 3) in my possession. The manager of Fairbanks' Infallible Scale Co, W H Harrison, lived in Baltimore, Maryland. But that gives rise to another question. Was W H Harrison the owner of Infallible before the company name changed to Fairbanks?

This patent of Feb. 28, 1882 post-dates the one you own, but James T McNally and Walter H Harrison of New York make no mention of yours in their patent papers, although they do obliquely admit to its existence, because they only patent the oblong base with side extensions and the flanges [supports to hold the rocker beam], not the whole design. This habit of patentees is a common practice but entirely within the law, of appearing to patent a whole device, but, if one reads the fine print, they only patent some petty detail. Just don't look at the patent drawing and believe it!

I had to go to *U.S. Coin Scales and Counterfeit Coin Detectors* [reviewed on the next page] by Eric Newman and A George Mallis, both long-standing members of ISASC, to sort out the early versions of this scale. John S Dye advertised a version labelled "J T McNally" in May 1879, but this version was screwed to a wooden base and cost only $2.50. Dye advertised for agents so presumably was more than an agent himself. See page IV-2-5 & 6.

Your Infallible advert appeared in *Harper's Weekly* in May, 1882, even though McNally & Harrison got a patent in February. See page IV-2-8.

Fig. 3. ∀∀ Note the date PAT. FEB 28, 82 on the counterbalance. Note also that the price had risen by 35 cents. This advert appeared in *Money* put out in 1896 by Fairbanks' Infallible Scale Co.



A look-alike on a rectangular base was advertised by the American Bankers' Agency in Sept. 1890, from 257 Broadway (whereas The Infallible Coin Scale Co was at 267 Broadway), and was only half the price of yours, at $2.50. A name is visible on the beam of the look-alike which is difficult to read, but might say J S COIN SCALE... See page IV-2-9.

An advert that was packed with one Fairbanks' Infallible scale, advertised the M.B. Coin Scale Co, 189 Fifth Street, Milwaukee, Wisconsin. The price is $2.50 only, but the wording of the advert is very similar to yours. No manufacturer is mentioned on the advert. See page IV-2-10.

An example in its original box is shown on page IV-2-11. The price, at $5.35, is the highest of those mentioned. A second advert in the box was for a handsome counter roberval "The Bankers' New Improved Gold and Silver Specie Tester", sold by W H Harrison of Equitable Buildings, Baltimore, MD.

Newman and Mallis compared the pressing used for the beams of the Fairbanks' Infallible with the pressing used for one stamped Fairbanks & Co. only. They were identical. See page IV-2-12. So when did the version stamped with Fairbanks & Co. start to be made? Can any member help?

Review

U.S. Coin Scales and Mechanical Counterfeit Coin Detectors by Eric P Newman and A George Mallis. No ISBN given. (Library of Congress Catalogue No. 91-091329.) Paperback, 11 x 8½ inches, 390 pages. 102 illustrations, adverts and engineering drawings. 45 pages of patent drawings. Available from EPNNES, 6450 Cecil Avenue, St Louis, MO 63105, for $39.50 postpaid, or from Galata Print Ltd, The Old White Lion, Market St, Llanfyllin, Powys, SY22 5BX, Wales.

In the nineteenth century there was a tremendous flowering of mechanical invention in the USA, especially in the second part of the century. As a result, American members of ISASC are fortunate in having an exciting range of coin-checking devices available for their collections. This book contains a vast amount of useful information about such devices.

First, we should ask: what is the distinction between an ordinary coin scale and a counterfeit coin detector (CCD)? The answer given by the authors is that a CCD should incorporate a means of checking the dimensions of a coin, as well as its mass. In this way the density of the object can be determined, and counterfeits that have the right mass but are made of the wrong metal can be detected. Perhaps the commonest device of this kind is the 'rocker' balance, which allows the mass of the coin to be checked by a simple counterbalanced beam, and the size to be checked by a gauge in the form of a slot. Many American CCDs are of this form, but there are also a number of other types.

Although such devices are known to have been produced in the USA from about 1834 onwards, the first US patents were not granted until 1853. After that there was a steady stream of patents until the early twentieth century, when the gold coins went out of circulation. Of course, not every device was patented. The first chapter of the book is a brief historical survey of coin scales and CCDs, from ancient times to the first US patents of 1853.

The next three chapters are the heart of the book. Chapter II contains the patent specifications and copies of the original drawings for 24 CCDs, from 1853 to 1925. These include equal arm balances, rocker balances, and several devices with mechanisms that are fairly complex.. On the other hand, I was interested to see the 1878 US patent granted to Baker and Simonton for an extremely simple CCD. It consisted of a zinc disc, and it worked on the electrolytic principle: you put the coin and the zinc disc together, and touch them with your tongue; if there is a tingling sensation then the coin is genuine.

This idea was registered in the UK, by Pilch of Sheffield, in 1874 (see Simmons Auction 14, lot 358), and examples by an unidentified English maker named Ashforth are also known.

Chapter III contains descriptions, including photographs, of coin scales and CCDs for which no patent documents are currently known. Most of these are variants of the rocker type. Similar descriptions of the patented devices are in Chapter IV. The book concludes with several short chapters and appendices containing additional information, including detailed drawings of a number of rare devices. The authors state that their aim was *to present the accumulated knowledge that is available from various sources*, and they are to be congratulated for having done so.

The book is ring bound *in order to simplify substitution of pages*, and this may well prove to be a useful feature, because although a vast amount of useful knowledge is presented, it is not organised in an obvious way. One wonders, for example, why the patents are given in Chapter II, whereas the descriptions of the devices mentioned in the patents are in Chapter IV. Fortunately there is an index which helps to overcome some of these difficulties, but the reader who want to discover all the pertinent information on any specific topic or object should be prepared for a certain amount of leafing back and forth. That said, the book is one which any serious student or collector of US coin scales and CCDs ought to possess.

N BIGGS

Notes & Queries

N & Q 114 — Reply from W BERNING

The strikingly unusual grocers' scale owned by E Comstock, EQM p 1538, stayed in my mind from 1992 until I obtained the US patent, no. 279,864. William Farnum of Hoosick Falls, NY, assigned one quarter of the rights to *Elisha* Peck of the same place. Could this be Peck, Stow & Wilcox, spring balance makers? Checking in Asher & Adams' *Pictorial Album of American Industry 1876*, told me that it was *Seth* Peck of Connecticut with S Stow and S C Wilcox who were the partners in Peck, Stow and Wilcox.

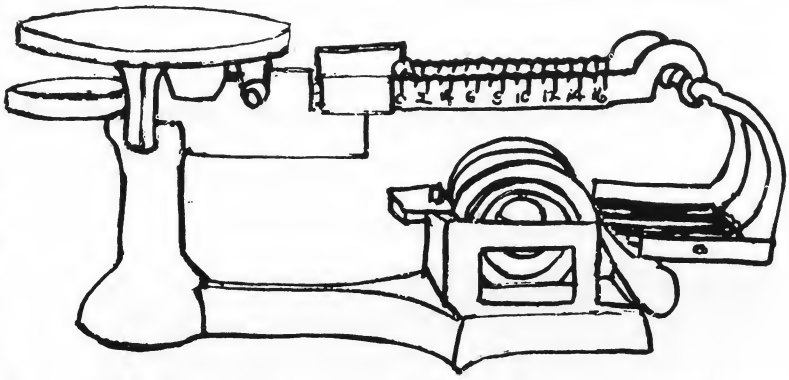


Fig. 1. AA Comstock's counter steelyard with two graduated beams. The weights are much heavier than those envisaged in the patent, being for 1, 4, 6, 8 and 10-lbs. The scoop that fits over the plate is not shown in this sketch. Sketch D Crawforth-Hitchins

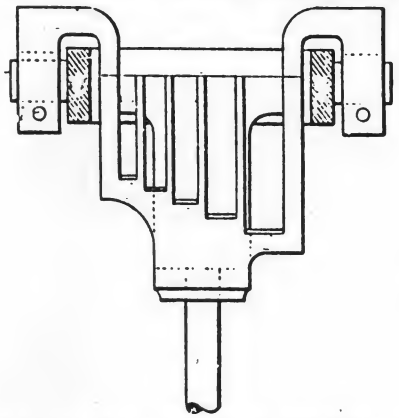


Fig. 2. AA Patent no 279,864. An edge view of the weight receptacle which is pivoted on one end of the scale-beam and holds the weights in position when the scale is used.

The patent was granted June 19, 1883, but there are no clues in the patent papers as to who manufactured the scale, unfortunately. As Farnum designed *pivot-bearings of novel construction* (Fig. 3) it might be thought that he was a manufacturer concerned to have simple, easily-assembled bearings.

He states that *...the novelty of this part of my invention consists in the use of metallic plate bent up in substantially the form shown and hung on a pin, so as to form a laterally swinging stirrup for the reception of the pivot-edge. For cheap work it possesses many advantages over the present mode of filing up a stirrup from solid*

steel and hanging the same on knife-edges. It also affords special facilities for proper alignment and adjustment of the scale-beam on its bearings.

The patent shows the cradle for the weights attached to a *roberval* counter scale, but the scale owned by E Comstock is a *steelyard* with the cradle mounted on the base below the double beam (see fig. 3). When reading the claims, it is clear that Farnum was patenting only the cradle for the weights and the rack into which the weights were rolled. Thus, Farnum could apply the cradle and rack to any type of scale he desired, and still be covered by the patent.

The weights drawn in the patent are plain discs of decreasing size, (Fig. 4) although Farnum states in the patent that *the weights may be made of all one diameter and the relative differences in their gravity can be secured by varying their thickness and removing the center, thus leaving them in the form of an annulus*. Comstock's weights are of the annulus form and of diminishing thickness. Farnum states that .....*Among the desirable results secured by my improvement the following may be named: the*

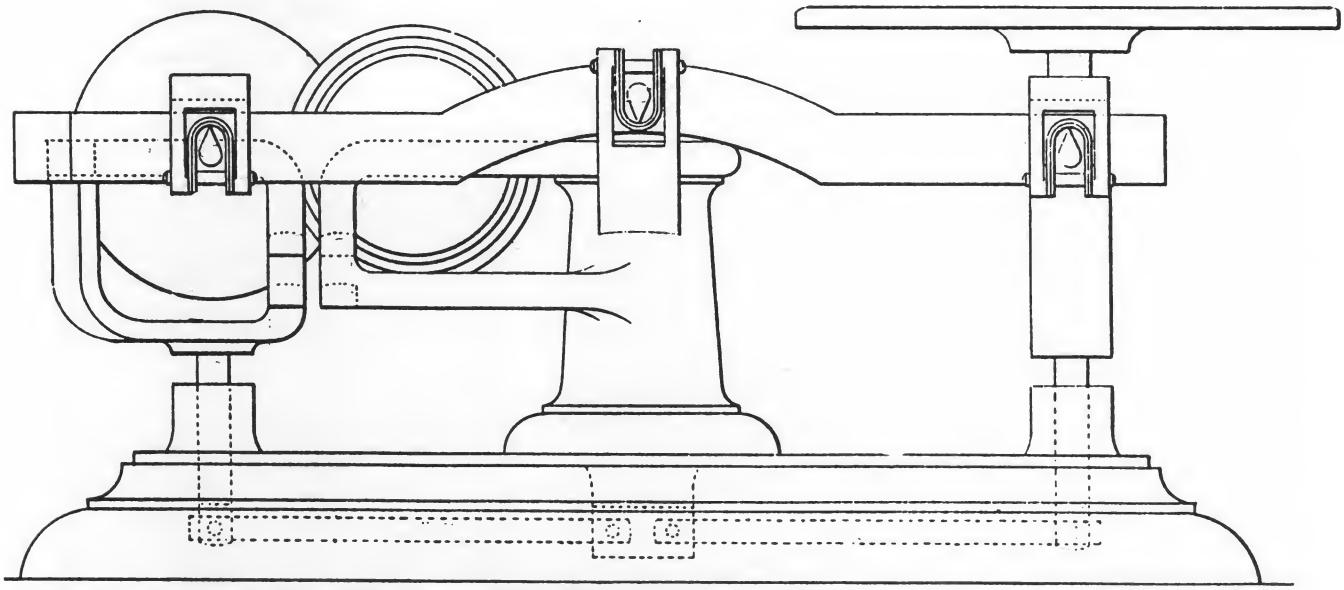


Fig. 3. AA William Farnum's patent no. 279,864. Shows a roberval scale with the weight-pan removed and replaced by a rack hanging under the beam. The central pillar has an arm going out to the left-hand-side which supports the cradle holding the weights. All six bearings on the upper beams are of his own design.

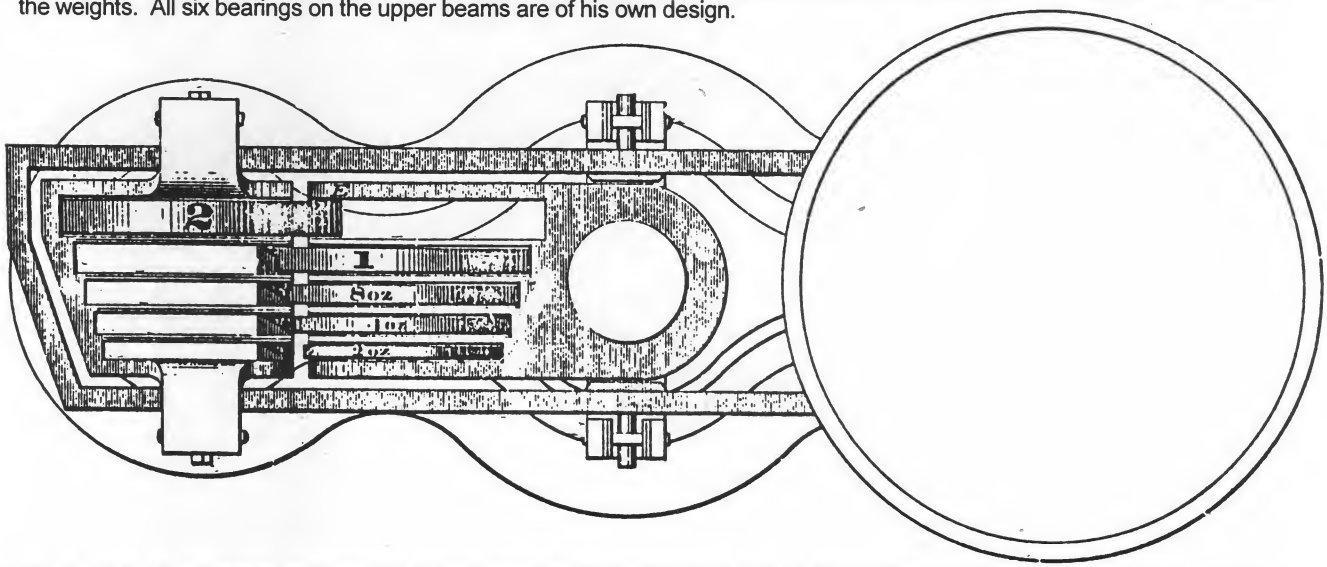
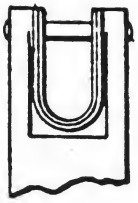


Fig. 4. AA A plan view of Farnum's patent showing the diminishing size of the weights in their rack. Note the eccentric shape of the beam as it skirts the end of the cradle.

Fig. 5. ➢➢ The pivot-bearings consist of a U-shaped stirrup made from a piece of flat rolled plate bent in the form shown, and pierced through its ends for the passage of the pin.



annoying inconvenience resulting from having a number of loose weights lying around on the counter; also, the facility with which a weight represented by a combination of several weights may be made up without being obliged to overhaul a pile of weights to get at the middle or bottom one. With my device it is only necessary to touch the desired weight or weights with the fingers and roll them from the rack into the cradle without disturbing the others. The weights are all arranged abreast of each other, instead of one behind or below another, and this arrangement permits any single weight to be moved out of its rank into the cradle without disturbing its fellow, a feature not found in other scales. The back and bottom stops of both cradle and rack are so arranged that the weight, when in either position, will have no tendency to roll out into the compartment opposite.

Weighing in India, 1733

CONTRIBUTED BY E COHN

From *The Ceremonies and Religious Customs of the Various Nations of the Known World*, vol. 7, by B Picart, published London, 1733. Translated from the French.

Bernier says "...The Balance in which the Monarch is weighed, is exceeding rich, the Beam, the

Fig. 1. Detail of the print on page 2415, showing clearly the scales with Nuremberg swan-neck ends. The pans have rims rolled round heavy wire to give extra strength. The cylindrical weights have knobbed tops. The weighing of the ruler, and the distribution of the equivalent of his weight in small coins to the populace, is a recurrent tradition.

Fig. 2. AA La Féte du Poids au Mogul. Greatly reduced. Contributed by E COHN

Chains, the Scales are Gold set with Jewels....The King magnificently attired and loaded with precious Stones, sits upon his Heels, or stands in one of the Scales. In the other are placed Bales of Goods....so well packed up, that none can see what is in them... They publickly declare how much the King weighs, and it is registered, as a Thing of great Moment to the State....When it appears by the Register, that he weighs more than the foregoing Year, the People give all possible Demonstrations of Joy, by repeated Acclamations, Bonefires, &c. No Doubt, this will appear very absurd to us Europeans; but we must own at the same Time, that if an Indian was to give an Account of our Ceremonies and Customs, many of them would be judged by him, and not without Foundation, to be as extravagant, as what we reproach them with."

The picture shows the mogul being weighed with tall cylindrical knobbed weights, surely a very early view of this design of weights. There is no sign, in the picture, of the "presents" that were to be balanced in the weight-pan.

Canal Weigh-house at Midford

BY R HALSE

On the banks of the old Somersetshire Coal Canal at Midford[1] there once stood 'a pleasing specimen of architecture', in the form of a weigh-house, which contained within a 'most ingenious piece of nineteenth-century industrial technology' - a weighing machine - capable of weighing fully-laden coal-barges of up to forty tons. What was this machine, why was it built and how did it work?.

Tolls

When a new canal was built it was nearly always paid for by private individuals - shareholders - who expected a return on their investment, as did the proprietors of the Somersetshire Coal Canal (SCC). This was done by charging 'tolls' for the use of the new waterway, calculated at a rate of so many pence per mile per ton of goods carried, and varied according to the goods carried. Bulk commodities like coal and stone were cheapest while iron and lead paid the highest rate.[2]

As tolls were paid on tonnage carried, some unscrupulous boatmen would try and avoid the correct payment by falsifying documents or by loading the boats over their maximum permitted weight. Because of these and other practices of fraud, the canal companies needed to find away of measuring the actual tonnage being carried and devised a system of 'gauging', or measuring the displacement of a boat in water.

Gauging

Gauging a new boat was a simple operation. Weights, originally made of stone but later of iron, were evenly loaded into the empty boat and measurements taken of the height of the boat above the water,

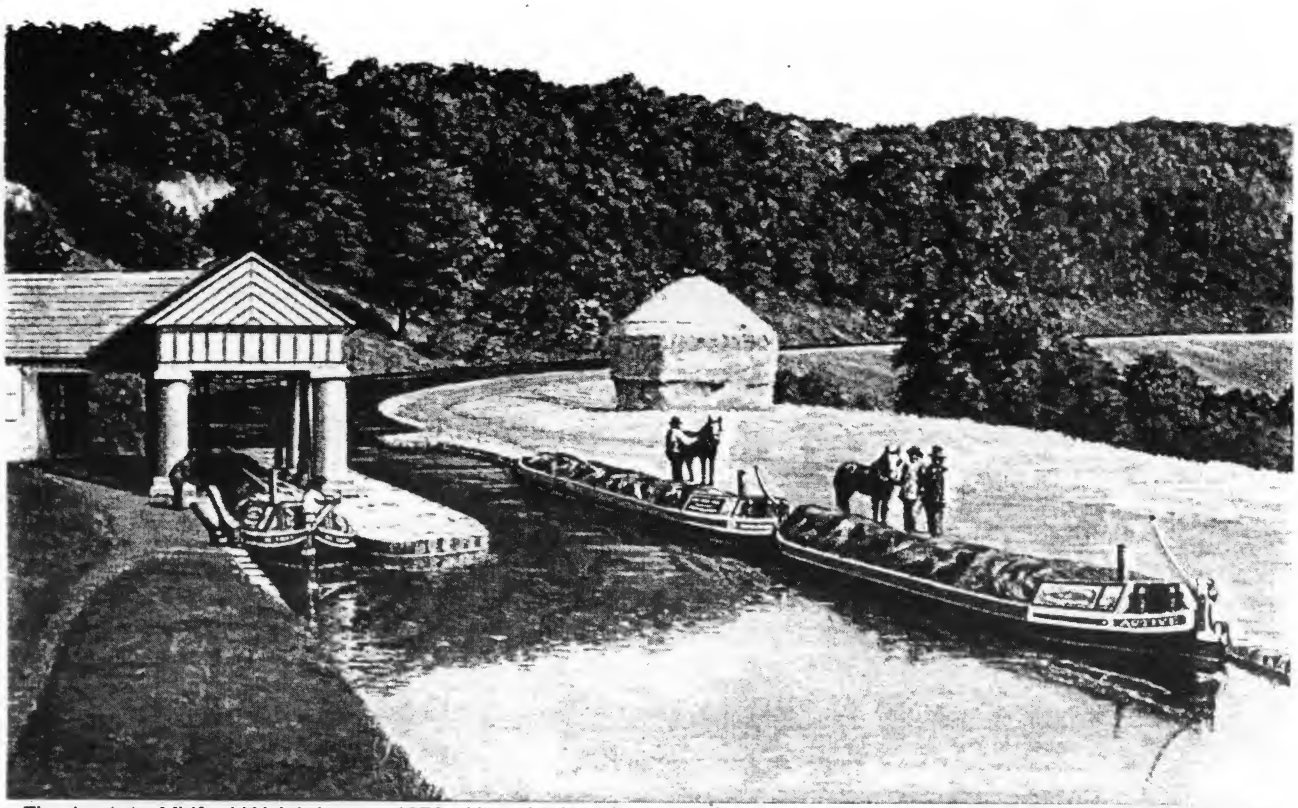


Fig. 1. AA Midford Weigh-house, 1870. Note the long boat entering the weigh-house. The long-boats on the right were pulled along the canal by the horses on the path. A family lived in each minute cabin at the rear, the wife or a child steering using the long tiller, and often the husband walking alongside the head of the horse. K R Clew

called the 'dry inches'. These measurements were taken at four points fore and aft, both port and starboard and an average figure was calculated from the readings. Extra weights were then loaded and measurements taken for every ton added until the boat was loaded to a safe maximum.

A metal plate with these measurements was then fixed to the boat at the four measuring points. These measurements were then entered into a record book called the Gauge Tables, along with brief details of the boat's dimensions, and were sent to every toll office on the navigation where the boat traded. Every boat new to the navigation would have to be gauged before it was allowed permission to carry goods along the navigation.

Checking the Weight

When a boat was being loaded the boatman would be given a way bill stating the cargo, the tonnage being carried, where it was loaded and its destination. When the boat arrived at the toll office the toll collector would copy these details onto a toll ticket along with the details of the boat, her owner, steerer, the distance travelled along the navigation and finally the toll to be paid. If the collector or inspector suspected that the boat was carrying more than the way bill he would gauge the boat, by measuring the dry inches at the four metal plates, find the average figure, and by checking this against his records of the boat would discover the tonnage. If this differed from the way bill then the boat-owner would have to pay the extra tolls and could even be fined under the navigation bye-laws. This method of gauging would have been used by the SCC up until the construction of the weigh-house at Midford.[3]

Construction

The weigh-house at Midford was built about two miles from the SCC's junction with the Kennet and Avon Canal (K&A) at Dundas, and about one mile below the Combe Hay flight of locks, and just a few hundred yards to the east of the junction of the two canal lines from Dunkerton and Radstock. All

of the traffic travelling along the canal to and from the north Somerset coal pits around Paulton, Camerton, Dunkerton and Radstock would have had to pass this point.

The actual date of construction of the weigh-house is not certain, but is believed to be about 1830-1831, for by March 1831 it was ready for inspection.

... the Weighing Machine erected on the Somerset Coal Canal at Midford having been surveyed last week by several gentlemen connected with the Coal Trade, and some eminent engineers and Boat Builders, all present were satisfied that the Weighing of the boats was effected with great facility and without the least injury to the boats.[4]

It consisted of a one-ended lock chamber, over which was placed the barge-weighing machinery, supported by six eight-foot-high Bath stone pillars and covered by a tiled roof. A small keeper's house was built adjacent to the lock and machinery, and was used to house the weighing-pan used for calculating the barges' weight and for use as an office. The toll collector's house was situated a few yards away next to the main road-bridge over the canal.

The actual size of the lock is not known but probably would have been the same size as the locks at Combe Hay, 75ft long x 7ft 3½ ins (69 x 2.4m) wide and would be capable of accommodating the average size of the 19th-century narrow coal barge of between 68 and 72ft long x 6 ft 10 ins beam.

The contractors involved in construction of both the building and the machinery are not known, but it is probable that the cast-iron machinery was forged locally then transported along the canal to Midford.[5]

Machinery Operation

Exact details of how the Midford machinery worked are not known. However, details of the mechanical operation do survive from a similar weighing machine built in 1836 for the Glamorganshire Canal at Tongwynlais near Cardiff.[6] It can be safely assumed that the Midford weighing machine would have worked in an almost identical way to this.

... The machine worked on the principle of the compound lever weighbridge, invented by John Wyatt of Birmingham in the 1740s.

It consisted of six cast-iron columns supporting a massive superstructure and an overhead system of levers from which a cast-iron cradle was suspended on five radial rods from each of the columns of the massive yoke.

The coal barge would be floated into the lock and the gate closed. A paddle would be raised to empty the lock and the barge would then settle down onto the cradle. The weight was then taken on the weighbeam, which was so poised upon a fulcrum that the leverage exerted was 112 to 1. The counterpoises inside the adjacent keeper's house took the form of convenient weights which were placed on the suspended pan up to a total of 800-1b equal to 800-cwt or 40 tons on the cradle.[7]

To those who are not engineering-minded the above description may seem complicated but in reality it was quite simple. Once the barge's weight was being supported by the cradle, the yoke (frame) would depress the levers thus raising the weigh-pan. A combination of weights of between one and sixty pounds were then added to, or subtracted from the weigh-pan until level (see diagrams below). A 1-lb weight on the weigh-pan was equal to 1 cwt on the cradle and a 20-1b weight equal to one ton.

Once the actual weight on the pan was known the gross weight could easily be calculated, and by deducting the known weight of the empty barge, the net weight of the cargo could be calculated and the necessary toll charges made.

Not every boat that passed the weighhouse would have been stopped and weighed. Those which were new to the canal were required to be weighed in order to find the net weight of the empty boat.

Any boat which the toll collector suspected was carrying more than the way bill stated, or which had 'incorrect' or 'missing' documentation would also have to be stopped and weighed.

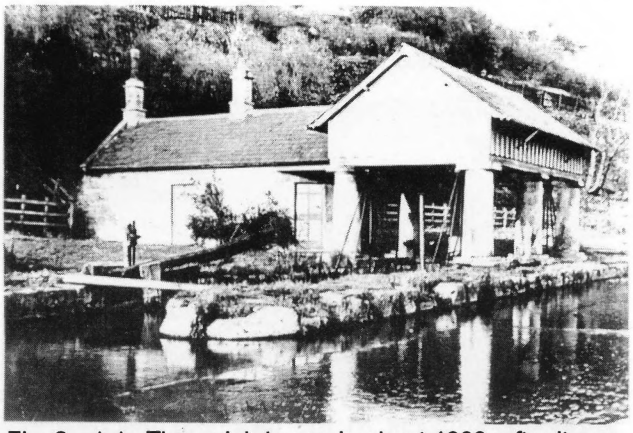


Fig. 2. ⩓⩓ The weigh-house in about 1900, after it was abandoned. A plank has been laid across the lock, as the lock gates were permanently open. The water in the lock conceals the lower part of the cradle over which the barge floated when the machine was in use. The cradle was basically a row of closely set iron bars, on which the flat-bottomed barge rested when the water was pumped out. L E Smith collection

As all the records relating to the weighhouse have been lost or destroyed it is difficult to find out what usage the machinery would have had, but some assumptions can be made based on other evidence available. The hours of operation were probably the same as the canal's; no barges were allowed to travel before sunrise or after sunset, unless with written authorisation; no barges were allowed to use the locks before 5.00am or after 7.00pm between 1st March and 1st October, or before sunrise or after sunset between 1st October and 1st March; no travelling on Sundays.[8]

The Midford weighing machine must have been successful in detecting unpaid tonnage, for following a visit to Midford by a local agent of the Thames & Severn Canal Company (T&S), plans were submitted to the committee of the T&S for a similar machine *to check the frauds known to be practised by the boatowners.*[9]

Closure

By the 1870s, trade on the SCC was in decline, and was to be further reduced by the purchase of the Radstock Tramway by the Somerset and Dorset Railway (for its Evercreech to Bath extension, opened in 1874) and by the opening of the Bristol and North Somerset Railway's Hallatrow to Camerton Branch in 1882. The reduced trade resulted in less use of the weigh-house.

By 1889 the SCC was running at a loss, the effects of railway competition to the SCC, and K&A, combined with the reduced output from the remaining coal pits forcing the SCC Company to look for ways of saving money and it was probably about then that the weighing machine was last used.

In August 1898 Sydney Bourne, who was travelling with a picnic party in a coal barge from Seend in Wiltshire to Dunkerton, reported that:

.....The Weighing machine at Midford was intact, with its ironwork ready to hold boat loads of coal .... but it could not have been used for a very long time, as it was standing amid a perfect bed of water-reeds.[10]

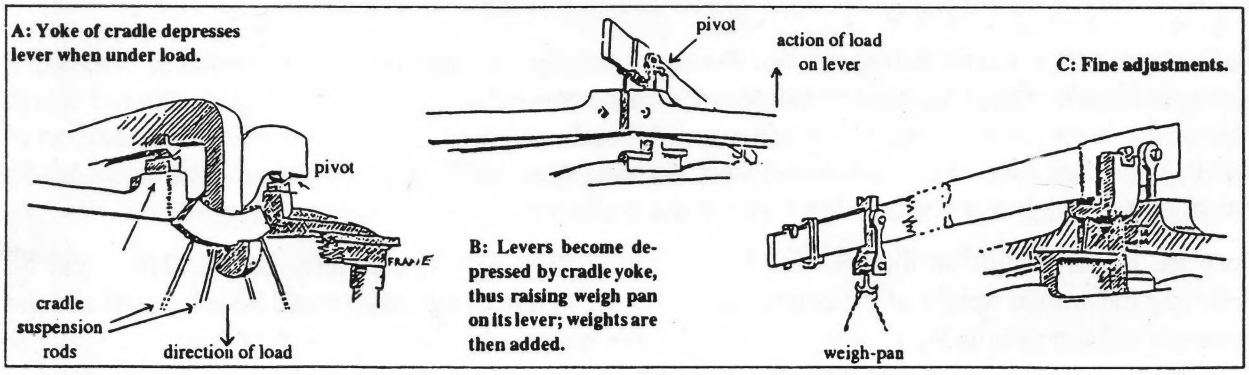


Fig. 3. ⩓⩓ Drawings of another Wyatt's VV design, now at Stoke Bruerne British Waterways museum. See EQM p 699 for photographs of this machine. The fulcrum of the main beam is near the centre, supported on the bar going between the two central pillars.

Following the abandonment of the canal in 1903, and its purchase by the Great Western Railway (GWR) in 1904, the canal was drained. The former toll collector al Midford, George Steger, purchased his cottage from the liquidator as a *sitting tenant.*[11] In 1907 the GWR began construction of the Camerton and Limpley Stoke Railway along parts of the old canal line and used the former keeper's cottage as an engineer's office. In 1910, when the railway was near completion the railway magazines of the time published articles about the railway and the old canal and one even reported talk of preserving *this curious old relic, a pleasing specimen of architecture.*[12] However, this preservation was not to be. In 1914 the weighing machinery, along with the six eight-foot high stone pillars were bought by an antique dealer, who found that because they were so massive he had to cut them up before he could get them away.[13] The arm of the canal leading to the weigh-house was converted for use as a cesspit.[14]

The single-storey keeper's cottage was converted during the 1920s into a two-storey house. Further modernisation in the 1980s removed most of the remaining original structure, changing the building beyond all recognition. The house and grounds are now private property and as such are not accessible to the public.

Epilogue

Although the Midford weighing machine has long gone, the machine from Cardiff is preserved at the Waterways Museum at Stoke Bruerne in Northamptonshire. Though not in working condition, it is still well worth a visit to view *a most ingenious piece of nineteenth-century industrial technology.*

Notes and References

This article has been compiled from information gathered from a variety of sources, and in particular:

Clew, K R, *The Somersetshire Coal Canal and Railways,* (SCC&R), (Bransbead edition, 1986); and

Wright, I L, A Canal-Age Relic on View, *Country Life,*. September 1974.

The author also acknowledges the help given by British Waterways Archives, Gloucester, and the Waterways Museum, Stoke Bruerne with the information on boat gauging and weighing machine operation.

1 About ten miles south of Bristol.

2 The Act of Parliament for the SCC authorised the tonnage rates at: 2½d per ton per mile for coal up to 4d per ton per mile for iron and lead. (SCC&R, p.55).

3 The Kennet & Avon Canal had a gauging station of its own at the entrance to the SCC at Dundas Wharf, and it is possible that the crane to the west of the entrance lock on the SCC may itself have been used for gauging purposes.

4 *Bath Journal*, 28th March 1831, (SCC&R, p.86).

5 The Paulton Brass & Iron Foundry were regular suppliers of cast-iron goods to the Canal Company.

6 Incorporated Society of Inspectors of Weights and Measures *Monthly Review*, November 1929.

7 Wright, I L, 'A Canal-Age Relic on View', *Country Life*, 12th September, 1974.

8 SCC Navigation Bye Laws. 8th June 1870.

9 Household, H, *The Thames and Severn Canal*, (David and Charles, 1969).

10 Letter from S H Bourne to *Country Life*. 11th May, 1951.

11 Letter from Dr L E Smith of Midford, (SCC&R, p.121).

12 *Railway Times*, 15th January, 1910.

13 Atthill, R, *The Curious Past* (Wessex Press, 1955).

14 *The Engineer*, 5th February, 1909.

This article was first published in *Five Arches*, 22, Spring, 1995, the journal of the Radstock, Midsommer Norton and District Museum Society. Thanks are extended to Roger Halse for permitting its further publication. It was brought to the attention of the editor by Paul Rossiter, ISASC member and enthusiastic local historian.

D L Vaid, Indian scale-maker

BY G WILSON

In an antique store in Bombay, I found a brass beam 13½ ins (335mm) long, with steel knife-edges and pivots staved into the beam. The pivots were removable stirrups, of sheet brass bent to hold V blocks. The shears were trapped on the beam by a transverse screw under the beam and had a small sight-hole.

Fig. 2. AA The stamps on my example were damaged by over-cleaning, but the Crawforth's trade-mark punch was clear. MAC

The beam had 'D L VAID' stamped into it in four places, twice with a fouled anchor trade mark. It was also stamped 'Class B' and 'To weigh 2kg' in both English and Hindi. It had a lead plug below the shears stamped 'MN' with an indecipherable logo and '80' and '82'.

The brass pans were spun into an unusual flared shape, 6¾ins (170mm) diameter, beaded (rolled over a wire for strength). The pans were stamped 'Master Registered' with a biplane logo, and 'O'.

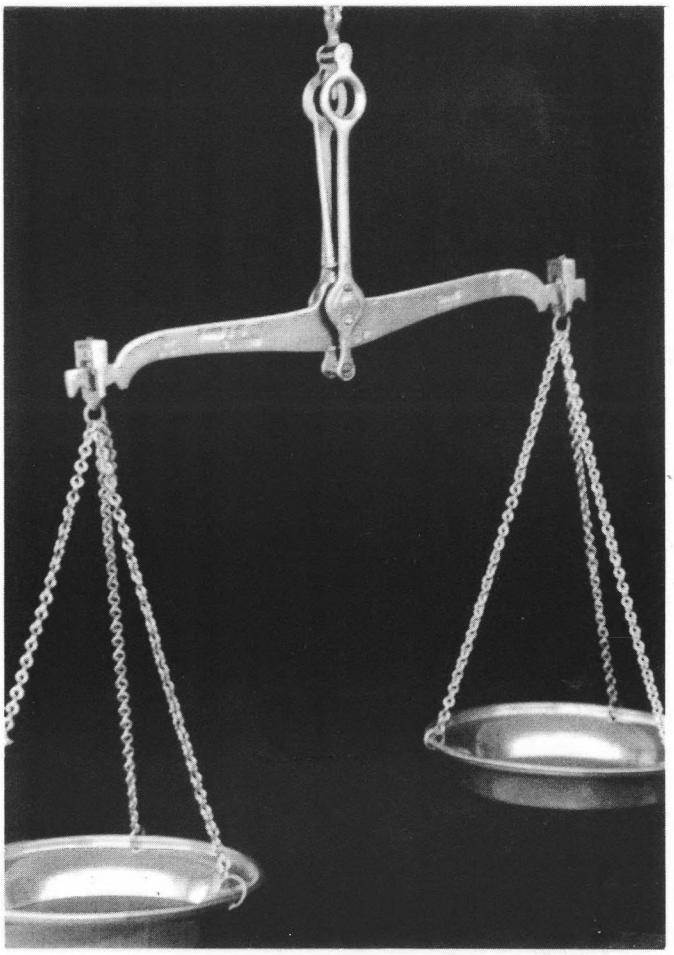


Fig. 1. AA D L Vaid brass trade beam. Photo G Wilson

Discussing this scale with the editor, she volunteered that she too had a beam by D L Vaid, but only 7½ins (195mm) long, Class C, to weigh 4oz. It is very similar to mine, except that all the metal parts appear to be chromium plated, and D L Vaid has stamped the pans as well as the beam with his name and trade mark.

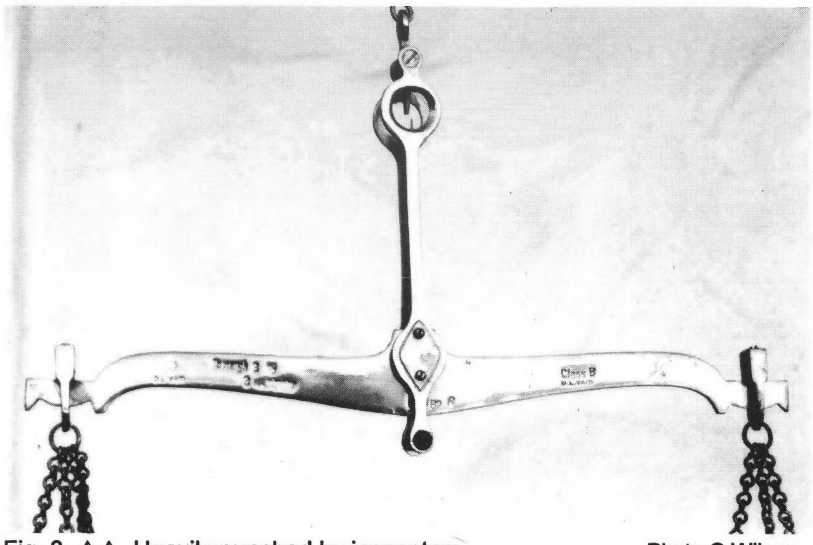


Fig. 3. AA Heavily punched by inspectors. Photo G Wilson

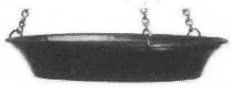


Fig. 4. AA Showing the pan's profile.

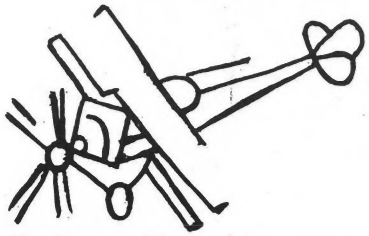


Fig. 5. AA The logo in my pans.